RAILROAD GAZETTE

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Contributions

The Scherzer Rolling Lift Bridges in Chicago.

Chicago, Aug. 1, 1902.

To the Editor of The Railroad Gazette:

In the issue of the *Railroad Gazette* of July 25, you published a letter by Mr. Albert H. Scherzer, President of the Scherzer Rolling Lift Bridge Company. If it were not for the wide circulation among engineers and others of your valuable publication, I would hardly consider it worth while to pay any attention to Mr. Scherzer's statements.

Mr. Scherzer has received from the citizens of Chicago in the last few years the following sums for the use of the so-called Scherzer bridge design and for some general plans in each case.

Eight-track bridge at Campbell avenue	$35,000.00
Taylor Street bridge	12,666.67
Canal Street bridge	18,000.00
Six other bridges, lump sum	108,000.00
C. T. T. Ry. bridge	25,333.33
Total	$199,000.00

Mr. Scherzer has stated that these sums are not paid as royalty, but for the work of preparing plans, inspection, supervision, bonds to guarantee the successful operation of the bridges, etc. As a matter of fact, the plans prepared by Mr. Scherzer are as general as they very well can be and the cost should not exceed $600 to $700 for each bridge. It is also well known that the Sanitary District has its own engineers and inspectors at each bridge and its own inspectors at the mills and shops. It can also be shown that the Scherzer Company, since other designs of bascule bridges were brought out, could afford to accept only $5,000 for similar privileges and services for a bridge at Cleveland, Ohio, and $6,000 for a bridge in Saginaw, Mich. It was on account of these exorbitant demands and the unreliability of the estimates prepared by Mr. Scherzer's company, and which will be referred to later on, that I, as City Engineer, concluded to prepare a design the adoption of which would not place the city at the mercy of a bridge monopoly. As a city official I was and am naturally interested in the design. There is absolutely no patent on this bridge. The whole world is welcome to use it. Financially I cannot therefore be in any way interested.

Mr. Scherzer's figures are remarkable. Let us analyze his comparison of cost between the Main street bridge and the Clybourne Place bridge (the former one built on the Scherzer design) as an illustration. Mr. Scherzer states that the bids received for the Main street structure were $120,388, while the bids received under same market conditions for the Clybourne Place bridge were $147,486. It can be readily ascertained from the records of the Sanitary District that up to June 4, 1902, there was paid for the substructure of the Main street bridge, exclusive of approaches and extras $62,584.75
The superstructure cost as per bid 72,800.00
Royalties, etc. 18,000.00
Total $153,384.75

What the final cost will be is not yet known.

Bear further in mind that the Main street bridge is designed on specifications that require about 20 per cent. less steel in its sections than the Clybourne Place bridge, which, in other words, is designed to stand about 20 per cent. more loading than the Main street bridge. The machinery at the Clybourne Place bridge is unusually powerful for the reason that it was thought desirable to make the machinery the same for all bridges for ease and facility of repairs and renewals.

The Main street bridge required no piles for foundations, owing to the character of the sub-soil, while piles were required at Clybourne Place, costing $9,240.50.

The Clybourne Place bridge has buckle plates and concrete flooring for better protection of the machinery, costing about $7,500, which Main street bridge has not. At Main street concrete is used, where at Clybourne Place granite or Bedford stone is used, adding considerably to the cost. As a whole, leaving principle of design out of the question, the Clybourne Place bridge is superior as to detail to the Main street bridge.

The actual cost of the substructure of the Clybourne Place bridge, exclusive of approaches, is $56,870.89 as against $62,584.75 for Main street. This (for Main street) does not include a few thousand dollars for extra contingencies.

The structural steel in the Main street bridge as per Sanitary District schedule is 1,120,000 lbs.; in Clybourne, 968,000 lbs.

The price for steel in the Main street bridge is about 3¼ cents per lb., while at Clybourne Place the price was nearly 5 cents per lb. The price per pound bid for the Canal street bridge, Scherzer design, by the same company that bid on the Main street bridge and at the same time, was 4¼ cents per lb.

It is generally understood by all parties concerned that a mistake of about $10,000 was made in the bid for the superstructure of the Main street bridge. This explains why the steel in said bridge figures so much lower than in the other bridges, and this also explains why Mr. Scherzer likes so much to refer to the cost of said bridge.

The high price paid for steel in the Clybourne Place structure is accounted for by the fact that, owing to the condition of the city finances, making it necessary for the contractors to wait for their money, they add a percentage to their bids over and above what their bid would be could they depend on obtaining the pay promptly.

A very careful estimate of comparison between the Main street design and the Clybourne Place design, reduced to the same specifications and the same general condition, made in May, 1901, shows the following results:

Clybourne Place Bridge Design (City Design).
140-ft. clear span; in accordance with Sanitary District specifications, without approaches and foundation piles $119,700

Main Street Bridge Design (Scherzer Design).
Under similar conditions 121,000
(This does not include royalty.)

The reliability of Mr. Scherzer's estimates can be further illustrated by reference to the records of the construction of the Taylor street bridge, a single roadway structure. Mr. Scherzer's original estimate for the bridge was about $58,000 complete.

The actual cost of this bridge as per final vouchers is as follows:

Superstructure	$55,827.86
Substructure	35,657.00
Royalty	12,666.67
Total cost	$104,151.43

as against Mr. Scherzer's estimate of about $58,000.

The eight-track railroad bridge at Campbell avenue was originally estimated to cost $350,000. The actual cost was:

For substructure	$340,649.60
For superstructure	250,565.00
Design and royalty	35,000.00
	$626,214.60
Estimated cost of bridge December, 1901	717,729.53

This bridge is at present a fixed bridge, counterweights and machinery at an estimated cost of over $150,000 being necessary before the bridge can be utilized as a movable bridge.

The bids for the Chicago Terminal Transfer Railway bridge on the Scherzer plans were as follows:

Superstructure	$214,500.00
Substructure	82,884.96
Total	$297,384.96

The cost as shown by final estimates is as follows:

Superstructure	$234,116.61
Substructure	112,782.71
Design and royalty	25,333.33
Total cost	$372,232.65

These are a few examples to show how much reliance should be placed in Mr. Scherzer's published figures and statements.

The City of Milwaukee, after considering all types of bascule bridges decided in favor of the trunnion bridge and has already constructed one at Grand avenue. The City Engineer informs me that two more bridges of the same design will be constructed in the near future. As to Mr. Scherzer's statement that the Scherzer bridges operated by the city are poorly maintained, I will only say that the Scherzer bridges are receiving the same attention that any other of the steel bridges receives. The appropriation for bridge and viaduct repairs being inadequate, it is not possible to give any of the bridges all the attention desirable. In the Van Buren street case we had two reserve armatures which both burned out in the course of a few days.

The Metropolitan Elevated Railway bridge is referred to by Mr. Scherzer as an example of a bridge that never gets out of order. Mr. Scherzer, in comparing this bridge with the Van Buren street bridge, should also have mentioned that the Metropolitan bridge is a four-leaf bridge or a double bridge, and that one bridge can be out of order without seriously interfering with the traffic; also that the power plant for this bridge consists of two 100-h.p. motors for each side, while the Van Buren street bridge has only two 25-h.p. motors on each side.

John Ericson, *M. Am. Soc. C. E., City Engineer.*

[Mr. Scherzer will reply to this letter next week, and meanwhile he requests a suspension of judgment.—Editor.]

A Matter of Names.

Pittsburgh, Pa., July 21, 1902.

To the Editor of The Railroad Gazette:

Without desiring to discuss or inaugurate a discussion of, the comprehensive question of the scope and proper application of the term "engineer," I am moved to record a protest against the utterly unwarranted practice, which, so far as I have observed, seems to be practically confined to a single metropolitan journal, of referring to the runner of a locomotive engine in the United States as an "engine driver." No employee so entitled is, to the best of my knowledge (and I believe that I am reasonably well informed), carried upon the pay roll of any railroad in this country, and I am unable to see any reason for the employment of the term, other than that it is "English, you know." This is not only an insufficient one, but also appears to smack somewhat of snobbery.

During the employment of the writer on the Baltimore & Ohio R. R. in 1863 and thereafter, every locomotive runner on that road was known and carried on the company's books as an "engineman," and it is my understanding that this practice, which is neither inaccurate nor inappropriate, has been continued to the present time. There would be, therefore, a warrant for the use of the term "engineman," by any one who might consider it to be more accurately descriptive than "engineer," but there is none whatever for "engine driver." The fact that an American locomotive runner, who is known to his employer and to the public as an "engineer" or "engineman," would be called an "engine driver" if he was doing duty in England, does not make the latter term any less a misnomer when applied to him here. A further objection to the term "engine driver" is that it is frequently used in a derogatory sense and as indicative of engineering ability which does not go further than that of stopping and starting an engine and oiling its journals. Instances of such application were presented in the course of the proceedings which culminated in the abolition of the engineer corps of the United States Navy, and the transfer of the duties of watch engineer *officers* to enlisted men.

I may also suggest that we do not have any "shunting" engines in the United States, although we have a large number which do work known in England by that name. We have no classification of engines known as "consolidated," and our "mogul" engines do not have *ten* wheels. There are, however, journals, and some which should be better informed, which frequently call a "consolidation" or 2-8 type engine a "consolidated," and refer to a 4-6 as a "mogul."

J. Snowden Bell.

Mr. Aspinall's Train Resistance Experiments.

Southern Pacific Company,
San Francisco, July 17, 1902.

To the Editor of The Railroad Gazette:

I am obliged to you for calling my attention to the article on Train Resistance in your issue of June 20.

It is the most complete and interesting article that I have ever seen upon the subject of train resistance; the experiments were conducted on very careful lines, and the results unquestionably show the resistance under the conditions of the several tests, as the method of making the experiments is as accurate as could be devised. The report also contains all of the formulæ of train resistance that I have ever seen, and the article as a whole is quite complete.

After arriving at a satisfactory formula for train resistance, the measure of its value is the use it can be put to in a practical application in train service; and the first paragraph stated under the head of "Conclusion" in the article by Mr. Aspinall, reading: "The formulæ given for train resistance are necessarily approximate formulæ only, giving average results," is directly to the point, and is in line with my conclusions after a study of this subject and its practical application for quite a number of years.

My experience teaches me that under average conditions of track and with from 50 to 60 lb. rail, the Wellington formula shows approximately the average freight train resistance at the usual freight train speed for fast freight service. With a heavy rail from 80 to 100 lbs., maintained to a high standard of surface and alignment, the resistance curves of Sinclair or Baldwin, showing much lower resistance at higher speed, will more nearly meet the conditions. The difference in the resistance of these several curves at a speed of 10 miles an hour is inappreciable. Hence for maximum loading in slow freight train service any of these curves would show approximately correct results; but for high speed freight trains, the track conditions must be considered in order to arrive at the most economical load that may be taken within schedule time.

The value of a resistance curve of course is in its application to a tonnage rating system for locomotives;

and in this connection a few suggestions of the points that should be considered in establishing a tonnage rating system may be interesting:

(1) The value of momentum in enabling trains to lift themselves over short hills when drawing heavy loads should be considered, as the energy gained by momentum can unquestionably be re-converted into work at any time without loss, and its amount for any given velocity can be determined.

(2) Following out this method, an equivalent profile of each section of track should be made, modifying the actual profile, showing the resistance at all points, and just what benefit may be derived from momentum in carrying loads over the grades.

(3) The question of weight allowance for empty or underloaded cars should be considered, making due allowance for less resistance on gradient sections, owing to the fact that only the rolling and atmospheric resistance are greater per weight unit of empty cars than per weight unit of loaded cars.

(4) Uniform train lengths for both hill and valley sections should not be assumed, but a check of trains on each freight run should be made, and the length of the longest train should be considered, which will give a margin of allowance for all shorter trains.

(5) The most important feature to be considered in locomotive rating on a given freight run is the time allowance to cover stops, as the practice develops that this is an extremely variable quantity, varying from 25 to 30 seconds per mile run on a practically level track, to 2 minutes and 30 seconds on heavy ascending grade lines, the variation being controlled by the physical characteristics of the track, the number of meeting points, the length of sidings to hold long trains, the facilities for taking fuel and water, the number of stops to be made, and the volume of tonnage handled in both directions. To arrive at the time needed on a given freight run for stops, which must necessarily be deducted from the schedule time in order to determine the actual running time of the locomotive for which it is desired to make an economical rating, a check of the service should be made, covering a period of about a month, and this allowance should give average results.

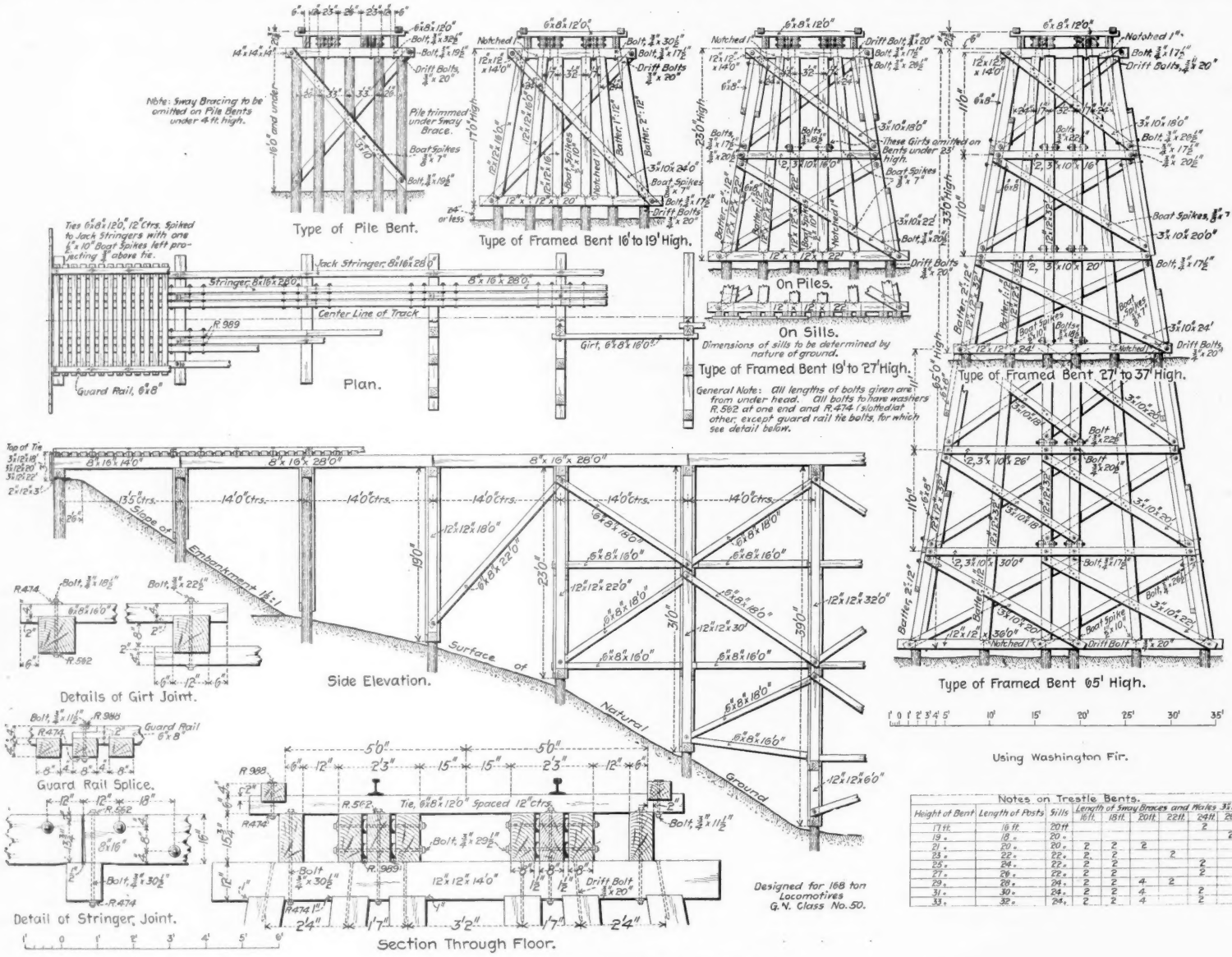
(6) The method for arriving at the power of the locomotives is also an important consideration; whether to use one-fourth or one-fifth the driver weight as a basis for rating engines. My experience teaches me that one-fifth of the driver weight gives about the best results that can be attained under average conditions on heavy grade lines, and about 22½ per cent. of the driver weight can be attained on practically level lines. The relation that the maximum traction bears to the driver weight of locomotives varies so greatly that it is necessary to place some arbitrary percentage of the driver weight beyond which point traction is not available.

A tonnage rating system carefully considered on the lines of the suggestions made herein will undoubtedly give favorable results.

B. A. WORTHINGTON.

Great Northern Standard Trestles.

The Great Northern Railway has lately adopted new plans for standard pile and trestle bridges. The details are shown by the accompanying illustration. This construction will be used on all future work for this road. A standard span length of 14 ft. is now used, instead of 16 ft. as formerly. The stringers are the same size as used on the larger span.



Standard Trestle—Great Northern Railway.

The Present Condition of Timber Preserving in the United States.

It will no doubt be of interest and of use to a considerable number of our readers to know what timber preserving plants are now running in the United States, their situation and capacity and the processes used. To that end we have compiled the table below. But it seems well to give also a short review of the art in general. Such a summary review also appears below. It is not supposed to be complete or exhaustive or new; but it is intended to put the reader who has not time to go far into the study of the matter in possession of the most material facts.

While Europeans have been experimenting for more than a century with methods and processes for preserving timber from decay, and have been using various of these processes on a commercial scale for a greater part of that time, attention has been directed to the subject in the United States only in comparatively recent years, and by only a few people. There is not a great deal of literature on the subject, as it relates to this country and what exists is mostly to be found in the Proceedings of the American Society of Civil Engineers, which body has been giving more or less attention to the matter for the past 25 years, and particularly as relating to the preservation of cross ties. In 1885 a quite exhaustive report was made to this Society by a committee appointed to investigate the subject, and this report says that it had become evident to engineers from the increasing price and growing difficulty in procuring good timber, lumber and railroad ties in the United States that several of the sources of such supplies were being rapidly exhausted, and that as a measure of both private and national economy it would soon become necessary for resort to be had to some artificial preservation of wood against decay.

That was 17 years ago, and had the statement of conditions at that time been based upon exact information regarding the entire timber supply of the United States, it is probable the supply would have been exhausted before now. However, no such exact information existed then, nor does it exist now; all estimates for tie timber are made for forest areas contiguous to the railroads, and while it is true that such areas are fast becoming denuded of good timber many roads are now drawing supplies from other sections of the country, still heavily wooded. It has been estimated that the annual consumption of ties for the United States exceeds 100,000,000, equal to more than 300,000,000 cu. ft. of the best quality of timber besides the waste. This means that each year millions of acres of the best forest areas must have their choice timber culled to supply this enormous demand. While there is a growing scarcity of the best grades of timber there still remain vast quantities of inferior grades, unsuitable for ties in the natural state, but which may be rendered satisfactory by suitable preservative treatment.

When Europeans took up the matter of preserving timber they tried thousands of experiments with scores of substances. One writer, M. Paulet, enumerates 173 processes or methods, most of which proved failures, but some four or five proved of value. Some of the processes that are successful abroad have proved unsatisfactory in the United States, due to several causes, chief of which is that the Europeans operate upon high-priced seasoned timber while that used in this country is usually low-priced, green or freshly cut, requiring different treatment.

The various modes of preserving woods which have been experimented with are summarized as follows:

1. Injecting in closed cylinders under pressure.
2. Steeping or immersion.
3. Bouchérie process of "vital suction."
4. Exposure to vapors.
5. Inward insertion of powders and liquids.
6. Charring, or the application of heat.
7. Painting.

Of these only the first two and the last are of importance, and the first is considered the most effective and expeditious.

Of the various processes for the use of injections or emulsions the more important that have been tried at various times or are still in use are:

Kyanizing.—This process was introduced in England in 1832 and consisted in steeping the timber in a solution of corrosive sublimate (chloride of mercury), probably

the most powerful antiseptic known. The process is very tedious.

Burnettizing.—In the original process the timber was steeped in a solution of chloride of zinc. As this was too tedious it was improved by placing the timber in a closed iron cylinder, steaming it, then forming a vacuum to extract the juices, after which the antiseptic is introduced under pressure. This process was first introduced into the United States in 1850, in a plant at Lowell, Mass. This was later (1862) reconverted into a kyanizing plant.

Creosoting.—Hot creosote oil is injected into the timber in a closed cylinder under heavy pressure. The process was invented and brought into use in England by Bethell in 1838. Creosote is undoubtedly the best known timber preservative, but as the substance is scarce in this country it makes the process expensive to a prohibitive degree. The first true creosoting experiments to be conducted in the United States were at Somerset, Mass., in 1865, in a plant for treating bridge piling.

Zinc-tannin.—Otherwise known as the Wellhouse process. This consists in the injection of a solution of chloride of zinc after proper steaming and subjection to a vacuum, followed by glue and tannin.

Zinc-creosote.—Injection of an emulsion of chloride of zinc and creosote.

Creo-resinate.—Injection of creosote, resin and formaldehyde.

Water-creosote.—Injection of an emulsion of creosote and water; not yet introduced commercially.

Allardyce process.—Injection of chloride of zinc followed by creosote.

Hasselmann process.—Boiling in sulphates of iron, copper, etc.

Thilmany process.—This consisted in the injection of sulphate of zinc or copper followed by an injection of chloride of barium. Thilmany also used Bouchérie's processes in this country; first that of "vital suction," i.e., the injection of sulphate of copper into the living tree to be taken up by the sap; later this was changed to injection in closed cylinders. (Abandoned.)

Zinc-gypsum.—Injection of a solution of chloride of zinc and gypsum. (Abandoned.)

American railroads first began experimenting in timber preserving some 40 years ago, but timber was still too plentiful and cheap to warrant any systematic effort at preservation, and it was not until 1885 that the price of ties had so advanced as to render some method of increasing their life desirable.

At present there are in the United States 23 plants in operation or building. They are given in the order built.

TIMBER PRESERVING PLANTS IN THE UNITED STATES.

Location.	Year built.	Owner.	Process.	Kind of Wood.	No. retorts.	Estimated capacity ties per annum.
Lowell, Mass.	1848	Locks and Canal Co.	Kyanizing	Various	2	30,000
W. Pascagoula, La.	1876	L. & N. R. R.	Creosoting	Pine, etc.	2	400,000
Long Island City, N. Y.	1878	Eppinger & Russell.	"	" "	4	1,200,000
Las Vegas, N. M.	1885	A. T. & S. F. R. R.	Zinc-chloride	Pine	3	500,000
Chicago.	1886	Chicago Tie Preserving Co.	Zinc-tannin	Hemlock	4	500,000
Oakland, Cal.	1889	Southern Pacific R. R.	Creosoting	Pine, etc.	2	1,000,000
Perth Amboy, N. J.	1890	U. S. Wood Preserving Co.	Creo-resinate	" "	4	1,200,000
Houston, Tex.	1891	Southern Pacific R. R.	Burnettizing	Pine, fir	5	1,500,000
California & Oregon.	1894	" " " "	"	" "	2	1,000,000
Norfolk, Va.	1896	Nor. Creosoting Co.	Creosoting	Pine, etc.	4	900,000
Somerville, Tex.	1897	Texas Tie & Lumber Co.	Various	" "	6	2,000,000
Beaumont, Tex.	1897	Int'l Creo. & Cons. Co.	"	" "	1	500,000
Bellemont, Ariz.	1898	A. T. & S. F. R. R.	Zinc-chloride	Pine	2	350,000
Sheridan, Wyo.	1899	Burlington Route	Burnettizing	Pine, etc.	2	500,000
Mt. Vernon, Ill.	1899	Chicago Tie Preserving Co.	Zinc-tannin	Black oak	1	200,000
Kalispell, Mont.	1901	Great Northern R. R.	" "	Pine, fir	4	1,200,000
Greenville, Tex.	1901	Mo. Kans. & Texas R. R.	" "	Pine, gum	3	900,000
Alamogordo, N. M.	1902	Alamogordo Lumber Co.	" "	Pine, fir, etc.	2	600,000
Portable Plant	1902	Union Pacific R. R.	" "	Pine, etc.	2	600,000
Portable Plant	1902	Oregon Short Line	" "	Pine, fir, etc.	2	600,000
Carbondale, Ill.	1902	Ayer-Lord Tie Co.	Various	Red and black oak	6	2,500,000
Grenada, Miss.	1902	" " " "	"	Pine, etc.	2	800,000
South'n Colo.	1902	Rocky Mt. Timber Co.	Zinc-tannin	" "	3	900,000

The last five plants are either under way or planned, the precise location of that of the Rocky Mountain Timber Co. not having yet been decided upon. The plant of the Ayer-Lord Tie Co. at Carbondale, Ill., will be a six-retort plant on the start, with provision to increase to eight. It will be equipped for treatment by any of the known successful processes, although "Burnettizing" will be used principally on the start. The Grenada, Miss., plant is not yet building, though preliminary arrangements are practically completed. This plant will be increased to four retorts later, and while it will likewise be equipped to administer various processes, creosoting will be done principally, as the product will be mostly for commercial purposes and will consist largely of timber and piling. All timber preserving plants are rated on their tie capacity, although various kinds of timber may be handled.

The two portable plants, of the Union Pacific and Oregon Short Line, are being built, the first of which will probably operate in Wyoming, for the present, and the latter in Washington.

The economy of preserving ties depends upon the relative prices of the durable woods and of the inferior kinds which are suitable for treatment. It has been demonstrated during the last 15 years that mountain pine, hemlock, black, red and water oak, when properly treated, last from 10 to 12 years in the track. When, therefore, such treated ties can be procured at the same price as white or burr oak, they are more economical. It is claimed that the Germans obtain 12 to 18 years life from pine and beech ties treated by the zinc-creosote process. This is more expensive than burnettizing, but it may be assumed, in a general way, that every year's life added to a tie beyond 10 is worth spending an additional sum of 5 cents in treatment.

We add a short list of references to reports and other articles which will be found useful, but it is far from complete. For many of the references we are indebted to a longer list printed in the *Journal of the Western Society of Engineers*, June, 1900.

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Preservative Treatment of Timber, O. Chanute, *Journal* Western Society of Engineers, March, 1900.

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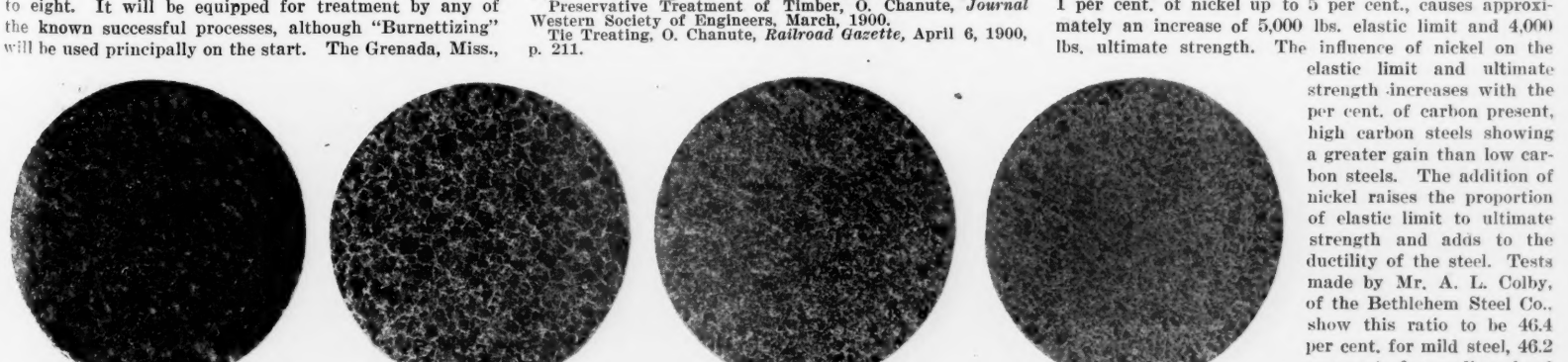
Reports of Committees on Ties, *Proceedings* American Railway Engineering and Maintenance of Way Assn., 1901 and 1902.

Tie Treating Plant of the Burlington & Missouri River at Edgmont, S. Dak., *Railroad Gazette*, April 6, 1900, p. 213.

Timber Preserving Plant of the Great Northern, *Railroad Gazette*, May 30, 1902, p. 396.



Carbon Steel. *Nickel Steel.* *Carbon Steel.* *Nickel Steel.*

Not Annealed. *Annealed.*

Fig. 2.

Nickel Steel.

Since the introduction of the Bessemer-Mushet process of steel making whereby the carburization was effected in a fluid state numerous attempts have been made to improve its properties by the introduction of other elements while in the fluid condition. Copper, tin, antimony, manganese, chromium, aluminum, tungsten, nickel, silicon, cobalt; singly or in combination have been tried as alloys with various results, some giving desirable and some very undesirable properties to the alloy. For some years before 1889, Mr. James Riley with Mr. J. F. Hall in England and M. Marbeau in France, experimented with nickel as an alloy with steel and almost simultaneously took out patents for the new material in both countries early in that year. The idea was not new, Sir Henry Bessemer as early as 1858 having called attention to the peculiar properties of the ferro-nickel alloys found in meteoric iron, but he himself failed to produce a similar alloy in the crucible furnace.

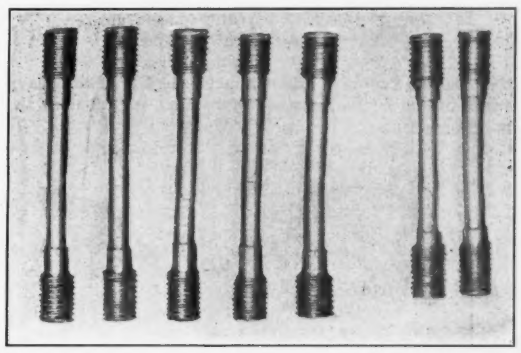


Fig. 1.—Test Pieces. 5 Forgings. 2 Castings.

Mr. Riley in a paper read before the Iron & Steel Institute some eight months after the granting of the patent, pointed out the advantage to be gained in using a material for all kinds of construction which had an ultimate strength of 30 per cent. and an elastic limit of from 60 per cent. to 70 per cent. greater than mild steel with equal ductility. Since that time the uses of nickel steel have rapidly developed for all kinds of work in which minimum weight with maximum strength is a prime requisite.

The melting point of nickel is 3,000 deg. Fahr., slightly higher than that of steel. It is not practicable therefore to add it in the ladle as is done with spiegel or other metals, but it is added with the charge directly, in either the open hearth or crucible methods either in the form of metallic nickel or the oxide, which contains about 77 per cent. nickel. Nickel steel is extremely sensitive to sudden changes of temperature and great care must be exercised to avoid sudden chilling, which may cause surface hardening, making proper working difficult. In general nickel steels, low in carbon, are treated as high carbon steels. The cold metal can be depended upon to resist rough handling and abuse, but when hot it should be treated with great care. The effect of nickel on low carbon steels or wrought-iron is to form a homogeneous alloy tougher and stronger than either iron or nickel. Low carbon steel cannot be made hard by the addition of nickel alone, which fact has been substantiated by numerous tests. In general the effect of nickel on hardness is not due to the influence of nickel alone, but to its effect on the carbon in rendering that element more sensitive to heat treatment.

Nickel steel is distinguished from simple steel by its high elastic strength. Three per cent. nickel alloyed with an open hearth steel of 0.25 per cent. carbon produces a metal equal in every way to a simple steel of 0.45 per cent. carbon, but having the ductility of low carbon steel. On low carbon steels, not annealed, the addition of each 1 per cent. of nickel up to 5 per cent., causes approximately an increase of 5,000 lbs. elastic limit and 4,000 lbs. ultimate strength. The influence of nickel on the elastic limit and ultimate strength increases with the per cent. of carbon present, high carbon steels showing a greater gain than low carbon steels. The addition of nickel raises the proportion of elastic limit to ultimate strength and adds to the ductility of the steel. Tests made by Mr. A. L. Colby, of the Bethlehem Steel Co., show this ratio to be 46.4 per cent. for mild steel, 46.2 per cent. for medium hard steel, and 58.7 per cent. for medium hard nickel steel. This effect of nickel upon the elastic limit accounts for the increased working capacity of nickel steel and its resistance to molecular fatigue.

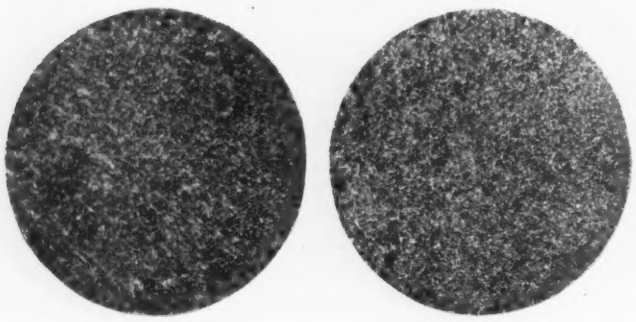
This particularly valuable alloy is steadily growing in use for locomotive parts and for some time it has been in general favor with marine engine builders on account of its increased strength, which permits a great saving in

weight. Some of the uses to which it is being put in locomotive building are given below.

Nickel-Steel Forgings.	*Nickel-Steel Castings.*
Driving wheel axles.	Frames and rails.
Tender truck axles.	Wheel centers.
Piston-rods.	Driving-boxes.
Connecting-rods.	Crossheads.
Guides.	Saddles (cellars).
Crank or wrist pins.	Rocker-shaft.
Guide yoke (bearer).	Steam-chests.
Spring links.	Guide yoke knees.
	Eccentric straps.
	Equalizing beams.
	Reverse shaft.
	Cross-ties.
	Cylinder heads.
	Furnace bearers.
	Water-space frame.
	Drawhead-pocket.
	Lifting-link.

It will be seen that this list includes most of the heavy parts of the engine together with those subjected to the greatest stress.

The Bethlehem Steel Co., who were among the first to make nickel steel in this country, and who have had much to do with its successful introduction into the arts, recently furnished the nickel steel forgings and castings for a narrow gage locomotive which showed the following excellent physical properties determined from standard 2½ in. x ½ in. tensile specimens and 1 in. x ½ in. bending test bars.



Carbon Steel. *Nickel Steel.*

Fig. 3.—Oil Tempered.

Nickel Steel Forgings.

	Tensile strength, lbs	Elastic limit, lbs.	Exten. Per cent.	Cont. Per cent.
Driving wheel axles.....	99,310	64,170	25.00	53.76
Piston rods	90,140	60,090	25.50	54.08
Main crank pins.....	93,570	65,450	24.00	49.37
Front crank pins.....	92,180	64,170	24.50	51.00
Connecting rods and guides	92,040	59,820	26.00	53.01
Nickel Steel Castings.				
Crosshead	84,540	53,980	18.50	31.10
Furnace-bearer, bearer guide	85,050	54,490	18.00	26.04

Fig. 1 shows the appearance of the test pieces after fracture. Assuming $.03 per lb. as the cost of introducing nickel into the forgings and castings for this locomotive, it cost only about $70 to very materially increase the life of the working parts, and most of this extra cost is returned to the purchaser when he returns this nickel steel to the steel maker as scrap.

Photo-micrographs of nickel and carbon steel under the same heat treatment, Figs. 2, 3 and 4, show the uniformly fine crystalline structure of nickel steel as compared to carbon steels. Fig. 4 shows the difference between the structure on the inside and outside of an axle, those taken from the outside portion illustrating the hardening effect of finishing shown by the finer and more homogeneous nature of the crystals.

The following table gives the physical properties in a comparative manner of nickel and carbon steels under different heat treatments, and Figs. 5 and 6 give a comparison of the ductility of the two metals under bending tests.

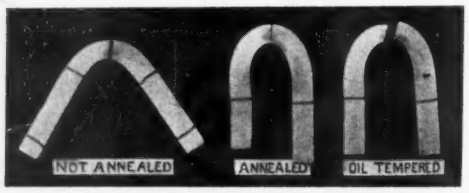


Fig. 5.—Carbon Steel Bending Test Pieces.

	Tensile strength, lbs.	Elastic limit, lbs.	Ext. Per cent.	Cont. Per cent.
Annealed:				
Carbon steel	109,500	51,440	19.50	36.31
Nickel-steel	100,330	66,720	25.00	54.56
Oil-tempered:				
Carbon steel	129,360	67,230	17.50	38.53
Nickel-steel	103,890	76,390	25.00	61.56

The wonderful results that can be obtained from nickel steel forgings by special heat treatment are shown in the table below. Note the unusually high elastic limits obtained without sacrifice of either extension or contraction of area.

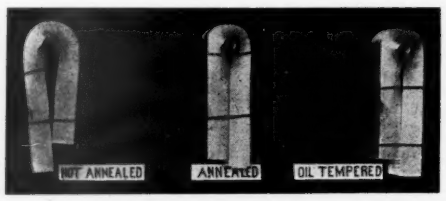


Fig. 6.—Nickel Steel Bending Test Pieces.

Small Rifle Barrels—Nickel Steel.

Tensile strength, lbs.	Elastic limit, lbs.	Ext. in 2 in. Per cent.	Cont. of area. Per cent.
115,100	99,820	23	64.00
114,080	97,780	23	64.95
114,590	99,820	23	65.45
116,620	96,770	22.50	62.05
116,120	97,780	23	64.00
114,590	98,800	24	62.53

With the present increased facilities for its manufacture on a large scale, its high elastic limit, together with its ductility as compared to other materials of construction, nickel steel is slowly coming into general use despite its added first cost. In no other field does it hold out so many advantages to be gained by its adoption as in locomotive building. Here great strength must be had, and the problem is to keep the weight of the parts within such limits that the additional boiler power required may be supplied without increased total weight. Its ability to resist sudden shocks, its ductility and high elastic and ultimate strength give it a great advantage over carbon steels, wrought or cast-iron. Its place in marine engineering is now assured and its introduction into new fields will be watched with interest.

The Constructive Features of the Goodwin Car.

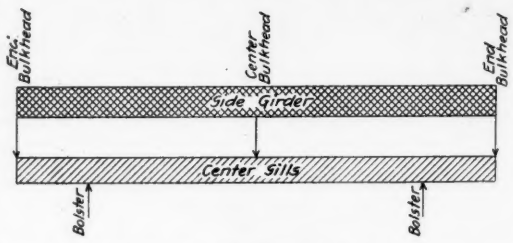
BY JOHN M. GOODWIN.

The rapidly increasing number of metal cars and their varied construction has forced upon the Master Car Builders the problem of maintenance of all steel cars and their repairs. The question is, can some of the defects which have been found in the past be eliminated and, if possible, some of the features avoided which have rendered the repairs difficult to make?

A light capacity car, in a mixed train, must stand the same crushing and pulling strains as the heavy capacity car, and should therefore be built with the same power to resist strains, shocks, jars and blows as the heavier car. This would seem to make advisable the adoption by the Master Car Builders of a standard factor of safety for all cars to be interchanged, regardless of the carrying capacity.

A special feature of the Goodwin car not to be found in other car constructions is the two-sill cantilever principle combined with a deep truss side girder, forming substantially a solid girder of the entire car. The sills taper from the center to the ends of the car, with their greatest depth at the center, thus giving them maximum strength at the point of maximum stress. These sills are made up of plates, with steel angles riveted on both sides at top and bottom, making an I-beam section. The two sills are bound together by heavy malleable castings at the body bolsters and at intermediate points, as well as at the bulk head lines, thus making a stiff box girder or backbone to the car. The apron castings which support the stationary aprons and the shaft carrying castings which support the central portion of the load are so arranged that they bind the car together laterally, thus giving the combined resistance of all parts in opposing any rupturing or distorting strains applied to any part of the car. The two pivotal points of support for the car body are at the body bolster lines. The three principal points of support for the load in the car are at the lines of the two end bulkheads and the center bulkhead. The construction of the frame of the car carries all of the load supported by the sides of the car or so-called side girders to these three main points of support on the center sills. These side girders being supported at these three points, it will readily be seen that any bearing down on the ends of the center sills beyond the truck bolster line will tend to raise the center bulkheads or the reverse is true; that is, any load tending to bear down the center bulkhead will tend to raise the end bulkheads. The diagram, figure 1, illustrates this principle of construction, which relieves about 33 per cent. of the sagging strain usually found in a car of similar length. With the center valves in carrying position the V-shaped construction obtained greatly increases the resistance to side warping or vertical buckling.

The draft springs used in the Goodwin car are special double coil twin springs 10½ in. long, giving a free movement of 2½ in. to the coupler, before the buffing lug of the coupler strikes the metal buffing plate. When the coupler is brought up solid against the buffing plates the draft springs have still ⅝ in. free movement; relieving the draft gear casting from all shearing strains, and thereby preventing the dislodgment of the draft gear from between the center sills. Any blow that is sufficiently powerful to close the coupler down against the buffing plate transfers the surplus momentum to the buffer plate, and from there direct to the two center sills or the back bone of the car, relieving the draft gear from all hammer blows. All pulling strains act in the same manner upon the draft gear. With this extra length of draft springs the engineman is enabled to start a heavy train by setting his engine back solid on the train, in this way compressing the free movement in the draft spring, then by quickly reversing his engine at the proper moment the recoil of the draft springs gives the required start to the train with even greater efficiency than picking up the slack of one car after another in the old way.



Distribution of Load on Goodwin Car.

The special ball and socket center plate and spring side bearing used on the Goodwin cars combined with the Barber side motion rollers over the bolster springs, give perfect freedom of motion in all directions on the roughest of construction tracks, relieving the car frame, the trucks and the track from shocks and jars usually sustained while running at high speed over rough tracks or around sharp curves. The upper semi-spherical center plate used has a slotted hole for the center pin, and the cup-shaped bottom center plate has no collar to prevent the free movement of the car body on the trucks in any direction.

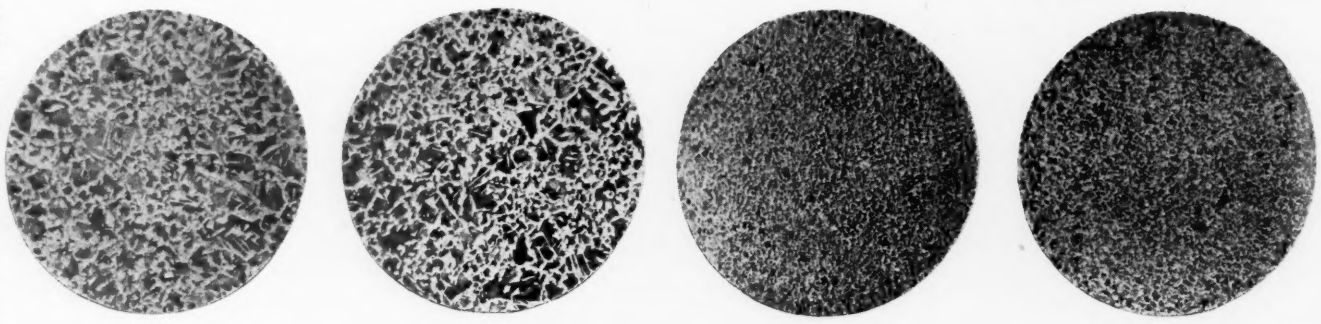


Fig. 4.

The truck side bearing used is the King special radial triplicate spring side bearing, and these are placed under the car so that the weight of the empty car body compresses them about ⅜ in. This assures the contact of the bearings under all conditions, as the swing of the car body to one side closes down the side bearing spring on that side, the opposite side bearing rises correspondingly, remaining in contact with the upper side bearing on the body bolster. This top side bearing is cup-shaped and filled with waste and oil. Being perforated in the bottom and always remaining in contact, the truck side bearings are kept lubricated and free from grit, enabling the car to round curves at high speed, without the usual resistance found to the turning of the truck on the side bearing, where a rigid free side bearing is used. With the special construction of the Goodwin car the free movement of the side bearings in rounding curves is 3⅝ in. each side of the center, and with this extreme movement the car can run around a 90 ft. radius curve, and still have full bearing on at least two of the double coil springs in each of the side bearings. The empty car body is carried at all times on the side bearing springs, relieving the shattering and jar usual with rigid free side bearings.

The question of the location of the center of gravity

of a large capacity car is of great importance. Actual calculations and practical tests show that the center of gravity in the Goodwin car is lower than the center of gravity in many of the cars in general service to-day, being, in fact, much lower than at first appears.

Two conditions which are met with in calculating the necessary strength of the parts of a car are, first, the capacity of the car, and, second, the shocks to which it will be subjected in every day service. To meet these conditions there must be such a distribution of material as to safely carry the load and withstand the shocks. There must be an economical point between the weight of a car that is too light and the weight of a car that is too heavy. In order to obtain this economical factor the entire service of a car, winter and summer, loaded and empty, running and standing, in ordinary and in extraordinary service, must be taken into consideration. The question has been, how severe a collision should a car be built to resist? The Goodwin car has been constructed, after many years of experimenting, to resist the every day accidents on freight handling railroads and to perform with safety and economy the services required of all the different classes of freight discharging cars. The heavy car carries more freight in a year's time through being built to carry the heavier and bulkier classes of material, than the lighter constructed cars, of the same stenciled capacity, which, through their lighter construction or their special form, are debarred from handling certain classes of freight, and therefore must run greater distances without a paying load. The overloading of a car is false economy. There is a certain point where the weight of the freight carried in a standard gage car is either too small or too great for maximum economy. It has been demonstrated that for the 4 ft. 8½ in. gage track the 80,000 lbs. load is more economical than a load in excess of this weight. To carry a greater load it is necessary to increase the size of the journals beyond 5 in. in diameter, or to increase the number of journals; either of which increases the friction. There must be a certain economical relation between the friction of the journals and the tractive power of the locomotive, or in other words the frictional resistance, and this point of economy has apparently been reached with a journal about 5 in. in diameter, compared with a locomotive under 135 tons weight. In considering the friction resistance, the percentage of grades and the degree of curves over which the trains are hauled must be taken into account. Also a decrease in frictional resistance during wet and cold weather must be considered when not only are the rails slippery, but the locomotive and cars work with greater friction owing to the chilling of the lubricating oils and the general stiff movement of all parts as well as the obstructions to the track and machinery from snow and ice.

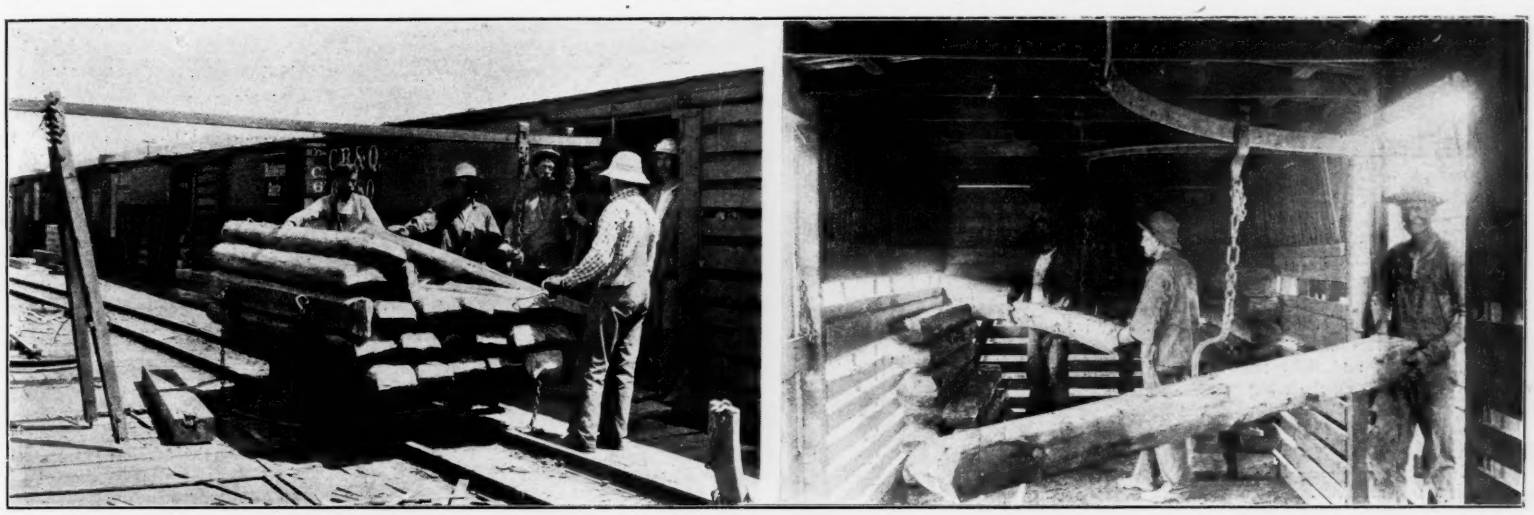
In the case of entire derailment of a car, or a portion of a train in such manner that the cars must be lifted or jacked on to the rails or out of the way, the Goodwin car is so constructed that it may readily be relieved of its load, making it less trouble to move the derailed car. To facilitate repair work the Goodwin Car Company has designed and built a steel pneumatic repair car, equipped with all pneumatic tools necessary for cutting, drilling, reaming and chipping, with power obtained from the air-brake system. The minor repairs necessary to keep the equipment in running condition may thus be readily attended to as soon as discovered. The pneumatic repair car allows the carrying of the shop to the wreck, obviating the necessity of taking the wreck to the shop. It also serves as a caboose, and the train of Goodwin cars may be operated from the roof of this caboose, where the operator has full view of his entire train.

Angier's Tie Loader.

In the *Railroad Gazette* of May 30, 1902, there appeared in an article entitled, "The Timber Preserving Plant of the Great Northern," on pages 396 and 397, a description of my patented device for loading ties into or out of box cars for shipment or treatment. As the description given was not a very lucid one, I take pleasure in sending you herewith two views of the tie loader taken "in action," which speak for themselves, and convey a better idea of its working than can be done by word.

As many of your readers no doubt are at the present time, or will be in the near future, interested in the subject of tie preserving, it appears to me desirable to make this more clearly understood.

Fig. 1 is a view from the loading platforms showing how the treated ties are carried from the cylinder truck on which they were treated, into the car. Fig. 2 is an interior view of a stock car, showing how the ties are carried into the car and stacked up. Much time and hard labor is saved by the use of this device, while it is quickly and easily transferred from one car to another, the time required to do this being but two to three minutes.



Angier's Tie Loader.

A gang of six men work on each car beginning the loading at both ends, working toward the center. The cylinder truck with the treated ties (holding 30 to 40 ties each) is run up the platform to the door of car to be loaded. Two men unload from the cylinder truck to the hanger and carrier. The tie is then run into the car, where two other men assist the "carriers" to unload and pile ties up in place. Both ends of the car are loaded at the same time without any interference, and without hard lifting (ties weighing 160 to 225 lbs. per piece) to be done by the men.

A cylinder truck of 30 to 40 ties is unloaded and neatly stacked up in car in an average time of five minutes, and when rushed a truck of 30 ties has been unloaded and stacked up in the car in one minute and 50 seconds. Six men easily handle 3,000 ties in 10 hours, the ties being treated and weighing nearly 200 lbs. each, while it takes 10 men to load the same number of untreated ties by hand, an untreated tie averaging 125 lbs. each. They also do this with less exertion of muscle or strength.

F. J. ANGIER, *Supt. Tie Plant, B. & M. R. R. R.*
Sheridan, Wyoming, July 22.

Cast Iron Chilled Wheels Under Passenger Cars.

BY S. J. DILLON.

After many years use of cast-iron chilled wheels under high speed passenger trains, it has been satisfactorily proven without elaborate and costly experiments that they are a safe and economical wheel for this service. Discoveries of incalculable value to the railroads have been made, which have been taken up and thoroughly discussed in the different conventions of the Master Car Builders, resulting in bringing the cast-iron chilled wheel up to its present state of perfection. One of the largest railroads in this country uses cast-iron chilled wheels exclusively under its passenger equipment cars, and it is no longer an open question whether this wheel is a safe and economical wheel for high speed passenger service.

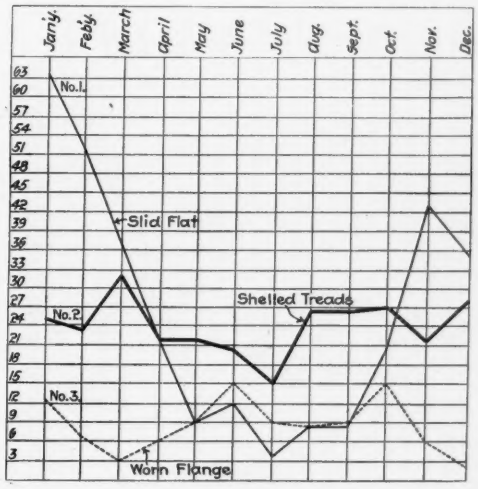
The wheel makers are in a position to make wheels which will meet the requirements of the most rigid specifications of the railroads, as they have been making an especial study of the production of high grade cast-iron wheels for particularly severe service. Two things are responsible for this: First, the very rigid system of tests to which these wheels are subjected, and second, the severe service in which the wheels are placed, that is, heavier cars, and higher train speeds.

The 33 in. x 36 in. wheels are used under passenger cars and are made in a contracting chill and afterwards machined on the tread by being rotated between rapidly revolving emery wheels. This process not only removes any slight irregularities, but leaves the wheel perfectly round, reducing the likelihood of "slid flats." The wheel will roll with less rail friction, and the power necessary to move the car will be decreased.

It has been found in good foundry practice that all chilled car wheels should be poured hot and fast in order to insure sound castings, but this does not necessarily mean that the metal should be poured faster in making a 36 in. wheel than in making a 33 in. wheel, as the difference in the mass of metal poured would not necessarily affect the character of the chill. It might affect its depth as that would depend upon the thickness of the tread section, as well as upon the grade or texture of the iron. A grade or texture of iron that would produce a very fair depth of chill on a 33 in. wheel would not be suitable for a wheel with a very thick tread, as the chill in all probability would be very slight.

All wheels are carefully inspected by the foundries before being accepted, and again inspected at the shop when mounted on axles, so that there is very little opportunity for a defective wheel to get into service. The thermal test is an indication of the thoroughness with which the users of cast-iron wheels have gone into the specifications for the manufacturers of chilled wheels. On account of the 36 in. wheels having a greater mass of metal, they are much heavier in tread and plates, and it is quite probable that the 2-minute thermal test is not severe enough for this type of wheel.

The most serious difficulty experienced with cast-wheels is slid flats, shelled treads and worn flanges. The accompanying diagram was plotted from figures showing the number of wheels removed for each of the defects mentioned for one year, at one of the large terminal yards in Jersey City, handling about 3,600 cast-iron wheels daily under passenger cars. It will be observed that there is a gradual decrease in the number of wheels removed for slid flats between January 1 to May 31, and also that the line of worn flanges falls below the lines for slid flats and shelled treads. This proves that if it were possible to run cast-iron chilled wheels with-



Wheels Drawn on Account of Slid Flats, Shelled Treads, Worn Flanges.

out brake action their life would be greatly prolonged. During the spring, fall and winter months, the climatic conditions are such as to cause a bad, slippery rail, causing the wheels to slide very readily, producing shelled out spots and slid flats. This will be observed in following the lines on the diagram showing wheels removed for these defects.

The increased weight of cars and constant and severe application of the brakes, heats up the tread, fire cracks and disintegrates the chill until shelled out spots develop. Longitudinal seams also occur from the same cause. These longitudinal seams have their origin frequently in fine fire cracks running transversely across the tread of the wheel from flange to edge of tread, caused by the heat engendered by the excessive use of the brake. I have found that these fire cracks occur at quite regular intervals of from 1 in. to 1½ in. apart, and extend to the depth of the chill. The force of the impact and weight of the load cause longitudinal cracks or seams to start from one transverse crack to another, until the seams, gradually extending, so weaken the flange or edge of the tread that a severe lateral thrust or blow coming on the edge of the tread causes pieces to break out. These pieces are very frequently broken out by badly

worn frogs, the wheel being otherwise in good condition. These longitudinal seams may be also caused by the constant grinding of the flange against the rail; in this case the wheel is generally worn "sharp flange" and the seam will be at a point where the base of the flange originally joined the tread.

The chill of the wheel is comprised of crystals which are radial to the plane of the chill mould against which they are cast. These chill crystals have faces, which separate like wood splitting with the grain. When these chill crystals are separated by the action of heat, as there is no cohesion, the constant pounding on the rail will cause them to shatter and fall out, causing what is known as "shelled out" spots.

The careless handling of the air-brake is responsible in a very large number of cases for slid flats and shelled out treads. The practice of the enginemen on some of the railroads is to make light train pipe reductions while the train speed is high, and a full reduction or brakes fully applied when train is about stopped, producing that unpleasant lurch and also the possibility of slid flats, which may be quite small and will not make a noise, but the constant pounding on the rail will cause the chill to shatter at these spots and finally develop shelled out spots. Some of the railroads have, however, observed the fallacy of this method of braking, and are introducing the two application stop, reversing the order of train pipe reductions or brake application, that is, a high train pipe reduction or full application when the train speed is high, and light train pipe reduction, or light application to bring the train at rest. This method of handling the brake will be more pleasant to the passengers and will greatly prolong the life of the cast-iron chilled wheel.

Consolidation Locomotive for the New York, Chicago & St. Louis.

The accompanying illustration shows one ot ten consolidation locomotives built by the American Locomotive Company at their Brooks Works for the "Nickel Plate."

There are several points of interest about these machines, notably the arrangement of ash pan hoppers with their doors operated by swing links, and also the pedestal binders, which are of the clamp type with screw and adjusting nut at one end. The fire-box is wide and deep and the entire boiler is raised so that the fire-box clears the rear drivers. This is in striking contrast with the class W consolidation locomotives of the Norfolk & Western (*Railroad Gazette*, April 25, 1902), and the standard H-6-a of the Pennsylvania (*Railroad Gazette*, April 4, 1902). These new engines have a total heating surface of 2,513 sq. ft. and weight on drivers of 140,000 lbs., giving a ratio of 1:56 between these two factors. The Pennsylvania and the Norfolk & Western engines have a ratio of 1:61 between weight on drivers and heating surface.

Tests of these new engines have been made by Mr. J. T. Carroll, Mechanical Engineer of the N. Y. C. & St. L. His report shows that a train composed of 77 empty and three loaded cars weighing 1,170 tons was hauled up a grade containing many curves of 26.4 ft. rise per mile at an average speed of 12 miles per hour with only 15 in. of cut-off in the cylinders. On another occasion the engine hauled 1,507 tons over a similar grade, starting the train from a dead stop. Indicator cards taken during these tests show an admirable steam distribution at all speeds and cut-offs.

The engine cylinders are 19 x 28 in. and the drivers are 69 in. in diameter. A general description follows:

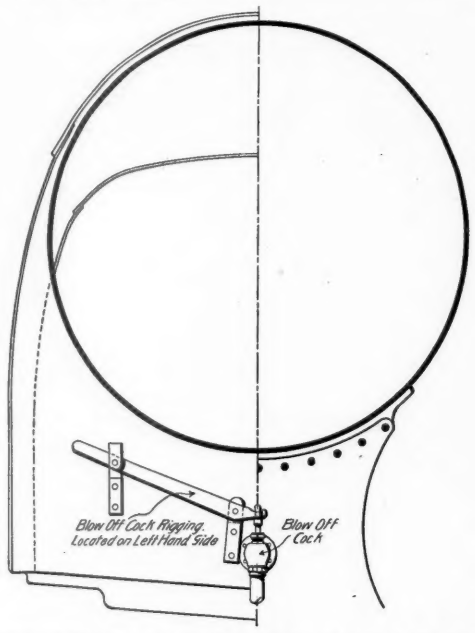
Kind of fuel to be used	Bituminous
Weight on drivers	140,000 lbs.
Weight on truck wheels	180,000 lbs.
Weight, total	158,000 lbs.
Weight, tender loaded	102,000 lbs.

General Dimensions.

Wheel base, total, of engine	25 ft. 0 in.
Wheel base, driving	16 ft. 9 in.
Wheel base, total (engine and tender)	52 ft. 4½ in.
Length over all, engine	38 ft. 8½ in.
Length over all, total, engine and tender	62 ft. 6 in.
Height, center of boiler above rails	9 ft. 6 in.
Height of stack above rails	14 ft. 11½ in.
Heating surface, fire-box	136.5 sq. ft.
Heating surface, tubes	2,353 sq. ft.
Heating surface, water tubes	23.8 sq. ft.
Heating surface, total	2,513.3 sq. ft.
Grate area	45.2 sq. ft.

Wheels and Journals.

Drivers, number	8
Drivers, diameter	62 in.
Drivers, material of centers	Cast steel
Truck wheels, diameter	33 in.



Blow-off Rigging for the New York, Chicago & St. Louis Consolidation Locomotive.

Journals, driving axle	9 x 11 in.
Journals, truck axle	6 x 12 in.
Main crank pin, size	6¼ in.

Cylinders.

Cylinders, diameter	19 in.
Piston, stroke	28 in.
Piston rod, diameter	3¾ in.
Main rod, length center to center	11 ft. 5 in.
Steam ports, length	24.2 in.
Steam ports, width	2½ in.
Exhaust ports, least area	65 sq. in.
Bridge, width	3⅛ in.

Valves.

Kind of	Improved piston
Greatest travel	5⅞ in.
Inside lap (steam)	1 in.
Exhaust clearance	0 in.
Lead in full gear	0 in.
Lead constant or variable	Variable

Boiler.

Boiler, type of	Extended wagon top
Boiler, working steam pressure	200 lbs.
Boiler, material in barrel	Steel
Boiler, thickness of material in barrel	⅝ in., 11/16 in., ½ in.
Boiler, diameter of barrel	64⅛ in.
Seams, kind of horizontal	Quintuple lap
Seams, kind of circumferential	Double
Thickness of tube sheets	⅝ in.
Thickness of crown sheet	⅜ in.
Crown sheet stayed with	Radial stays
Dome, diameter	30 in.

Fire-box.

Length	7 ft. 6 in.
Width	6 ft. 2 in.
Depth, front	65¼ in.
Depth, back	52½ in.
Material	Steel
Brick arch	On water tubes
Water space, width	Sides, 5½ in.; back, 6 in.
Grate, kind of	Rocking

Tubes.

Number	306
Material	Steel
Outside diameter	2 in.
Length over sheets	14 ft. 9¾ in.

Smoke-box.

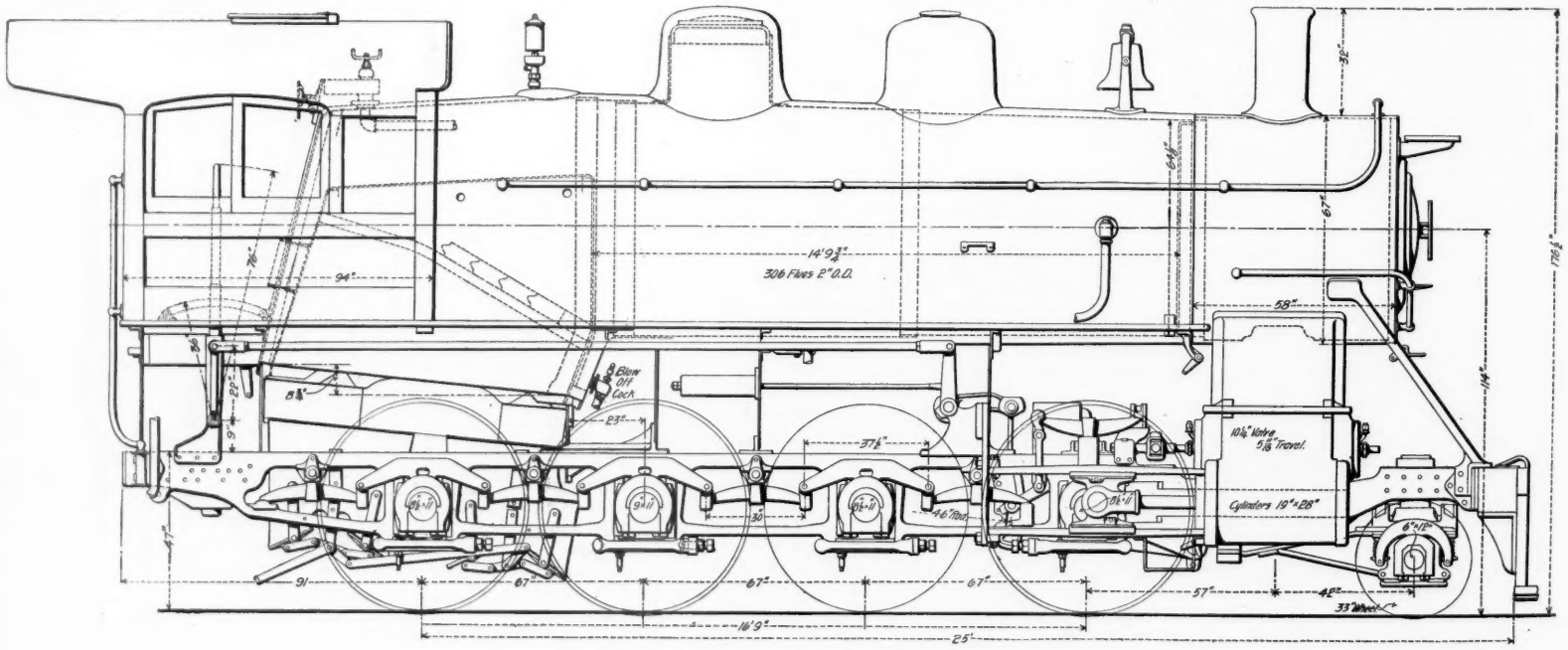
Smoke-box, diameter	67 in.
Smoke-box, length	62 in.

Other Parts.

Exhaust nozzle, single or double	Single
Exhaust nozzle, variable or permanent	Permanent
Exhaust nozzle, diameter	5 in.
Exhaust nozzle, distance of tip below center of boiler	3 in.
Netting, wire or plate	Wire
Netting, size of mesh or perforation	2½ x 2½ in.
Stack, straight or taper	Taper
Stack, least diameter	14⅞ in.
Stack, greatest diameter	16 in.
Stack, height above smoke-box	2 ft. 8 in.

Tender.

Type	8-wheel
Tank capacity for water	5,000 gals.
Coal capacity	10 tons
Kind of material in tank	Steel
Thickness of tank sheets	¼ in.
Type of under-frame, wood or iron	Oak
Type of truck	Brooks all metal
Type of truck spring	Triple elliptic
Diameter of truck wheels	33 in.
Diameter and length of axle journals	5 x 9 in.
Distance between centers of journals	65 in.
Diameter of wheel fit on axle	6⅝ in.
Diameter of center of axle	5⅝ in.
Length of tender frame over bumpers	21 ft.
Length of tank	19 ft. 6 in.
Width of tank	9 ft. 8 in.
Height of tank, not including collar	61¼ in.
Type of back drawhead	R. R. Co.'s



Consolidation Locomotive for the New York, Chicago & St. Louis

The Engineering and Maintenance-of-Way Association

In view of the discussion at the third annual convention in regard to the committee work of the Association, the Board of Direction has decided to outline the work for the various committees for the current year, and to prescribe the form in which it is desired that the reports shall be submitted to the Association.

It is considered essential to the full development of the work assigned to the Committees that definitions of the technical terms used in the work of each Committee should be formulated, also that standard specifications be prepared, and the results submitted to the Association for approval. This part of the work should receive from each Committee the earliest attention.

All reports should be framed to conform to the following general plan:

First, *Historical*: A brief account of the history of the subject-matter of the report, giving an outline of the origin and development of the same.

Second, *Analytical*: An analysis of the subject-matter of the report, especially of the most important elements thereof.

Third, *Argument*: A statement giving the advantages in favor of the recommended practices and the disadvantages of the old or present practices.

Fourth, *Conclusions*: The final recommendations for the adoption of the various elements of the report in the order of sequence.

The Board of Direction has determined on the publication of Bulletins which shall contain reports from one or more committees, each succeeding Bulletin to contain any written discussions that may be received on the reports published in the preceding one. The bulletins will be issued as rapidly as the reports of the Committees are received by the Secretary.

The following is a list of the subjects selected by the Board of Direction, and the Chairmen and Vice-Chairmen of the fifteen standing committees:

No. 1.—Committee on Roadway.

1. Definitions of terms.
2. Specifications, adaptable to various methods of work on new lines and revision of old lines—to include uniform classification of materials.

W. McNab, Assistant Engineer, Grand Trunk Railway System, Montreal, Canada, Chairman.
C. Dougherty, Superintendent, Illinois Central Railroad, Clinton, Ill., Vice-Chairman.

No. 2.—Committee on Ballasting.

1. Definitions of terms.
2. Specifications for ballast.
3. What constitutes ballasted track.

E. Holbrook, Chief Engineer, Kansas City Southern Railway, Kansas City, Mo., Chairman.
F. A. Molitor, Chief Engineer, Choctaw, Oklahoma & Gulf Railroad, Little Rock, Ark., Vice-Chairman.

No. 3.—Committee on Ties.

1. Definitions of terms.
2. Specifications of untreated ties.
3. Inspection and classification of new ties.
4. Statistics.
5. Preservative processes.

E. B. Cushing, Engineer Maintenance-of-Way, Southern Pacific Co., Atl. System, Houston, Tex., Chairman.
Robert Bell, Superintendent, Pennsylvania Railroad, Buffalo, N. Y., Vice-Chairman.

No. 4.—Committee on Rail.

1. Definitions of terms.
2. General specifications.

R. Trimble, Principal Assistant Engineer, Pennsylvania Lines West of Pittsburgh, Pa., Chairman.
Wm. R. Webster, Consulting and Inspecting Engineer, Philadelphia, Pa., Vice-Chairman.

No. 5.—Committee on Track.

1. Definitions of terms.
2. Maintenance of Line, Maintenance of Surface and Maintenance of Gage.

W. B. Poland, Division Engineer, Baltimore & Ohio Railroad, Pittsburgh, Pa., Chairman.
W. M. Camp, Editor, *Railway and Engineering Review*, Chicago, Ill., Vice-Chairman.

No. 6.—Committee on Buildings.

1. Definitions of terms.
2. Specifications.
3. Passenger Stations.

H. W. Parkhurst, Engineer B. & B., Illinois Central Railroad, Chicago, Ill., Chairman.
A. R. Raymer, Asst. Chief Engineer, Pittsburgh & Lake Erie Railroad, Pittsburgh, Pa., Vice-Chairman.

No. 7.—Committee on Wooden Bridges and Trestles.

1. Definitions of terms.
2. Specifications.
3. Trestles.

D. W. Lum, Engineer B. & B., Southern Railway, Washington, D. C., Chairman.
C. F. Loweth, Eng. & Supt. B. & B., C. M. & St. P. Railway, Chicago, Vice-Chairman.

No. 8.—Committee on Masonry.

1. Definitions of terms.
2. Specifications.
3. Concrete Masonry and Cements.

H. G. Kelley, Chief Engineer, Minneapolis & St. Louis Railway, Minneapolis, Minn., Chairman.
W. L. Breckenridge, Chief Engineer, Chicago, Burlington & Quincy Railroad, Chicago, Ill., Vice-Chairman.

No. 9.—Committee on Signs, Fences, Crossings and Cattle-Guards.

1. Definitions of terms.
2. Specifications.
3. Fences and Cattle-Guards.

A. S. Baldwin, Principal Assistant Engineer, Illinois Central Railroad, Chicago, Ill., Chairman.
E. G. Ericson, Assistant Engineer, Pennsylvania Lines, Pittsburgh, Pa., Vice-Chairman.

No. 10.—Committee on Signaling and Interlocking.

1. Definitions of terms.
2. Specifications.
3. Train-order Signals, Interlocking Signals, Block Signals.

J. C. Mock, Signal Engineer, Michigan Central Railroad, Detroit, Mich., Chairman.
W. C. Cushing, Superintendent, Pennsylvania Lines West, Pittsburgh, Pa., Vice-Chairman.

No. 11.—Committee on Records, Reports and Accounts.

1. Definitions of terms.
2. Specifications.
3. Bridge Department Forms, to include Labor and Material Reports, Inspection Reports and Office Records.

Edwin F. Wendt, Assistant Engineer, Pittsburgh & Lake Erie Railroad, Pittsburgh, Pa., Chairman.
George Houliston, Assistant Engineer, Pennsylvania Railroad, Buffalo, N. Y., Vice-Chairman.

No. 12.—Committee on Uniform Rules, Organization, Titles, Etc.

1. Definitions of terms.
2. List of subjects which will form a basis of a uniform code of rules for the Maintenance-of-Way Department.

J. A. Barnard, General Manager, Peoria & Eastern Railway, Indianapolis, Ind., Chairman.
J. H. Abbott, Division Engineer, Baltimore & Ohio Railroad, Cleveland, Ohio, Vice-Chairman.

No. 13.—Committee on Water Service.

1. Definitions of terms.
2. Character of water, giving analyses of good and bad water for boilers; also of compounds to counteract impurities.
3. Methods of purification.

O. D. Richards, Chief Engineer, Ann Arbor Railroad, Toledo, Ohio, Chairman.
J. L. Frazier, General Superintendent, T., St. L. & W. R. R., Frankfort, Ind., Vice-Chairman.

No 14.—Committee on Yards and Terminals.

1. Definitions of terms.
2. Freight Terminals.

C. S. Sims, General Superintendent, Baltimore & Ohio Railroad, New York, N. Y., Chairman.
W. G. Besler, General Manager, Central Railroad of New Jersey, New York, N. Y., Vice-Chairman.

No. 15.—Committee on Iron and Steel Structures.

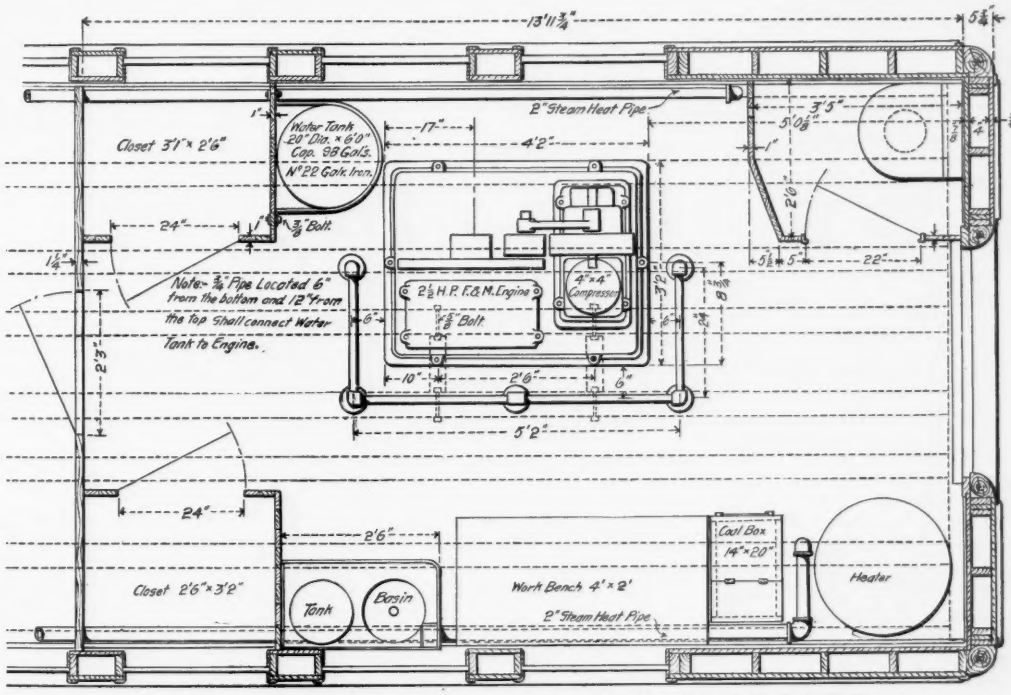
1. Definitions of terms.
2. Specifications for material and workmanship.

J. P. Snow, Bridge Engineer, Boston & Maine Railroad, Boston, Mass., Chairman.
B. Douglas, Bridge Engineer, Michigan Central Railroad, Detroit, Mich., Vice-Chairman

Air-Brake Instruction Car—New York Central & Hudson River.

The New York Central & Hudson River Railroad has recently turned out from its West Albany shops an air-brake instruction car which, while similar in many respects to others now in use, has some novel features. It is 60 ft. over end sills, inside length 59 ft. 2¼ in., divided into three compartments, those at each end being 13 ft. 11¾ in. long. The inside width is 8 ft. 10¼ in., height from floor to deck line 7 ft. 6⅛ in., giving a roomy car. The compartment at one end is fitted for quarters for the men in charge of the car and contains a double berth, lavatory, desk and chairs. The center compartment is used as the instruction room and contains all the apparatus pertaining to air-brakes and train signals. In the compartment at the other end is installed the gas engine and air compressor, which supplies the power for the car. As will be seen from the engraving the engine and compressor are mounted compactly on one base and occupy but little space. The engine is a 2½ h.p. single-cylinder, Fairbanks & Morse gasoline engine, belt-connected to a 4 in. x 4 in. single-cylinder vertical compressor over idlers. A 98 gal. tank supplies cooling water to the engine cylinder. Closets, heater, work bench, lavatory and wash basin take up the remaining room. The compressed air is stored in a main reservoir 20 in. x 40 in., placed in one end of the instruction room, from which the supply is drawn either through the engineer's valve or special pipes to operate the various pieces of apparatus. An adjustable automatic governor keeps the pressure in the reservoir down to any pressure desired, allowing the surplus air from the compressor which runs at a constant speed, to leak off to the atmosphere. In order to show the operation of the air-pump, the steam end is connected to the air reservoir and the pump run by compressed air, no work being done in the air end.

The instruction apparatus includes all the parts, connected up in working order, of a complete installation for passenger coach, freight car, engine driver and truck brakes and tender brakes. The piping is so arranged that they may be all operated singly or together from an engineer's valve. A complete train signaling apparatus is mounted under the roof and connected up as in service. The cylinders, reservoirs and triple valves for a 20-car train are mounted in a vertical position in a rack with the necessary amount of train pipe suspended under the car. Four braces from the crossties under the



Location of Engine and Compressor—Air-Brake Instruction Car, N. Y. C. & H. R.

floor running diagonally up through the rack to the deck sills, serve to keep the cylinders in alignment.

Special attention has been paid to light and ventilation. The sides of the car are pierced with 10 windows each, in the length of the instruction compartment, and in addition eight trap doors or hatchways each 4 ft. 1⅛ in. x 18 in. opening are cut in the roof. These may be opened in fair weather and very materially increased light and ventilation be had. The apparatus is so arranged that all the windows are available for light.

The car will accommodate comfortably about 20 persons. It is in charge of W. H. Foster, Supervisor of Air-Brakes for the Eastern Divisions. After making a tour of the lines and giving instructions to all the trainmen, he expects to conduct oral examinations covering the instruction given.

The Bagdad Railroad.*

The announcement that a concession has been granted to the Deutsche Bank for the construction of a railroad from Konia to Bagdad with certain branches and possible extensions, recalls from oblivion a long story of futile effort in England. For about half a century there was no scheme more insistently pressed upon British Cabinets, the House of Commons, and the public, than that of establishing a steam route to the Persian Gulf and India, by way of Mesopotamia. Born almost with the birth of railroads, the project died a lingering death with the consolidation of British control over Egypt and the destinies of the Suez Canal.

It is a story in three chapters, all equally barren of practical result. Chapter the First is an interesting record of abortive attempts made from 1835 to about 1845 to promote navigation on the Euphrates up to the latitude of Aleppo. Chapter the Second opens about 1851, with the promotion of a private company to make a through line from the mouth of the Syrian Orontes to the valley of the Euphrates at Jaber, and thence to the Persian Gulf at Kuweit. This company, under the lead of Mr. Andrew, Chairman of the Delhi, Punjab & Scinde Railway, and using General Chesney as its advisor and surveyor in chief, actually obtained from the Porte in 1856 a concession and a promise of a 6 per cent. guarantee on the capital to be expended. But the guarantee was never secured, the company did not fill its subscription and the concession lapsed. Tardy recognition of the interest of the Sultan led indeed to an amended project in 1863, wherein the Company promised to bring their rail-head ultimately to the Sea of Marmora. But by that time French influence had waxed strong in Syria, and the Porte had become suspicious of any British route to India which might lie through its territory. Chapter the Third tells the story of foredoomed efforts to induce the British Government to carry the scheme through as a national undertaking, and as a counterweight to the completed Canal, whose danger as a route for troops was painted in vivid colors.

Technically, the German Bagdad Company's scheme is at this moment no nearer realization than was the project of the British Euphrates Company in 1856. A rough survey only has been made of the proposed route; the Ottoman guarantee, though promised, is not secured; and the capital sum is yet to find. But, practically, it is in a far more hopeful position. For, in the first place, it is in the hands of nationals, whose embassies back private commercial enterprises in Turkey. In the second place, the two most powerful financial influences at Constantinople, the Deutsche Bank and the Imperial Ottoman Bank, are main parties to it. And in the third and chief place, the attitude of the Porte towards this project is such as it has never been to any British railroad scheme.

For many reasons the Ottoman attitude to this new Franco-German scheme is favorable. The Sultan has no reason to fear, and much reason to forward it. In the dual control of the line by two rival nationalities, neither of whom has an interest in the East worth comparison with the British or the Russian, he sees no danger to his own Imperial rights before the 99 years shall have elapsed, after which he will presumably have the right to acquire, under conditions, the fee simple of the whole concern. Nor is his attitude passive only. The part played by the Dedeagach-Salonica line in the Greek War of 1897 has disposed him actively to favor strategic railroads.

In comparing the prospects of the Bagdad scheme with those of the abortive Euphrates schemes, it must be remembered that the Deutsche Bank has no international complications to face. Russian and French opposition have equally been conciliated by the adoption of the Konia route, instead of that by Angora. For thus, on the one hand, the line will be connected with the French railheads in Asia Minor, and, on the other, it will not offer any strategic menace to the Armenian frontier.

Nor, again, while it is the shorter route by 450 kilometers, does this encounter any natural difficulties not superable at moderate cost. There are only two mountain ranges to be scaled and two second-class and two first-class rivers to be crossed. The first range is the Taurus, to be penetrated by the Gulek Pass, the "Cilician Gates." At its start from Konia the line will find itself already at an altitude of 3,500 ft., and the summit of the Gulek Pass is no higher. Thereafter there is a fall to within a hundred feet of sea level at Adana, and the rise to the summit of the second range, the Giaur Dagh, will be about equal to the Tauric descent, if the Arslanli Bel, above Bagché, be the selected pass. A short tunnel, however, through the narrow crest above Hassan Beyli would obviate nearly 1,000 ft. of this climb, and of the subsequent descent to the plain of the Kara Su, the northernmost tributary of the Orontes. The two second-class rivers will be encountered near together after leaving Adana. The first, the Saris, or Sihun, subject as it is to great and sudden floods, will need a bridge near a quarter of a mile long. The second, the Jihun, or Pyramus, is less wide, but deeper and more rapid. The two first-class rivers are the Euphrates and the Tigris. The first is to be crossed some distance below Birejik and near Jerablûs. The bridge will be, it is said, half a mile in length, and the midway piers must be set in a very rapid stream. The Tigris need not be crossed at all if, not Bagdad itself, but its right-bank suburb prove to be the engineers' objective. But since a branch to Khanikin, on the Persian frontier, is an essential part of the proposed system, the Tigris will probably be crossed by the main line between Tekrit and Samara.

For the rest, the route lies over very easy country from Konia to the foot of Taurus, from Taurus to the Giaur Dagh, and from the Euphrates to Bagdad—in fact, for

*Extract from an article by D. G. Hogarth, in the *National Review* (London), for May.

three-fourths of its whole course; and the interval of rolling hill and valley between the Giaur Dagh and the Euphrates should present no serious difficulty. The line will follow the Kara Su valley till it can round the southern butt of the Kurt Dagh; and the ridges dividing the three basins, which must be crossed thereafter, are not above 700 ft. higher than the beds of their main rivers, the Kara Su, Afrin, and Kowaik. The Cilician Plain and the upper valley of the Kara Su are marshy, but not seriously so; and probably the engineers will have more difficulty with deficient water and blowing sands on the section through Harran and Ras-el-Ain to Mosul, than with mountains, rivers or marshes at any point.

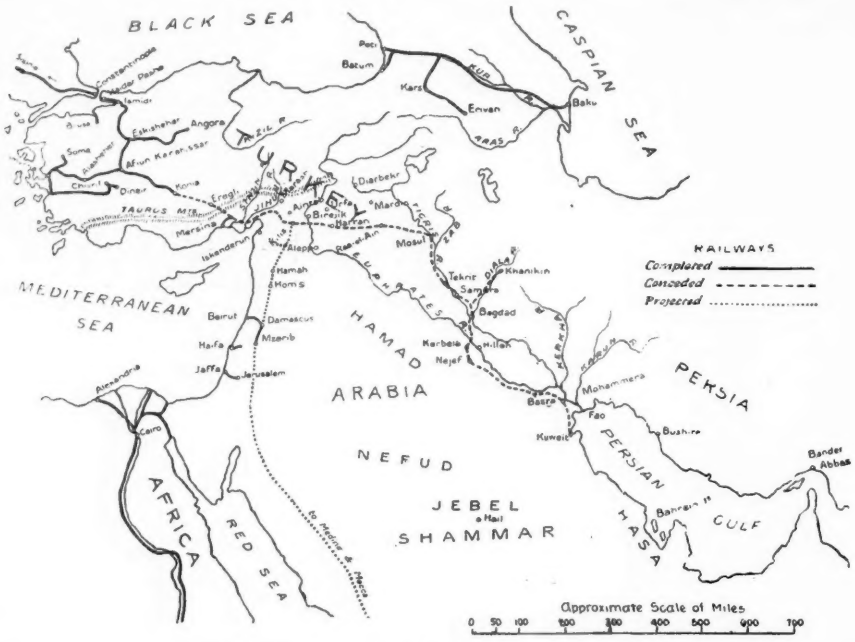
There is a crux however, and it is financial. The Deutsche Bank constructed the Angora and Konia railroads on an annual guarantee of 15,500 francs per kilometer, which sum represents about 7 per cent. on the construction outlay. The Porte has promised for the Bagdad Extension the sum of 12,500 francs per kilometer, with 4,500 added for working expenses. Since the estimated expense of construction is 200,000 francs per kilometer, this guarantee would seem to promise about 6 per cent. on the initial outlay, and a certain further percentage on the expense of rolling stock and working. Supposing, however, unimpeachable security for the Ottoman guarantee to have been found, there is a very large capital sum to find. In appealing either to private or to public confidence, the promoters will have to face certain questions. In the first place, is their estimate of the expenses of construction so reliable that the guarantee, being a fixed sum, may be assumed to represent the estimated percentage? The possibility of a large margin of error can the less be excluded in this instance, since the surveys of the engineers up to the present moment seem to have been very summary, and their estimates to have been based on the construction expenses of the Angora and Konia lines. In making these latter railroads, however, neither mountain-chains nor large rivers had to be dealt with; and now that they are made, they are confessedly not capable of carrying heavy or express traffic.

In the second place, what returns are there likely to be? As the route is now laid down, it will be very hard to make any convincing show of the commercial posibilities of the Bagdad line. With the route now adopted in the agreement between the contracting parties, nearly all the dream of tapping a lucrative local commerce and developing it tenfold, melts away. From the Giaur Dagh eastwards, the most direct route whereon a railroad can be easily constructed, worked and protected, has been adopted irrespective of populous centers or rich lands.

We may add that next to no local return can be looked for in North Syria and Mesopotamia. The down-stream exports of Mosul will doubtless be floated to Bagdad on rafts in the future, as in the past. The railroad may carry in return the up-river goods to Mosul, but their whole annual value at present is under £20,000. To hope to compete with the great waterways lower down is quixotism.

It seems improbable that the Gulf extension can, or will, be made, except at the pressing instance, and with the co-operation of some Government other than the Ottoman. The only Governments sufficiently interested to take decided action would be, on the one hand, the German, on behalf of its commercial colonial policy in Asia and the already existent stake of its nationals in Turkish railroads, or, on the other, the British, whether desirous to strengthen the Ottoman Empire or to obtain an effective voice in the control of an overland route, which, though not of immediate importance to the Farther East, might become so in certain eventualities—if, for example, a rival European Power were to acquire control of it, or it were proposed to link it with the Indian railroad system. As things are at present, and are likely to be for some time to come, in the Persian Gulf, the German Government would have to reckon more seriously with opposition from Great Britain, than the British Government with opposition from Germany; and it is, therefore, more probable that the Kuweit Extension, if ever proceeded with, will be made through the co-operation of the latter than of the former Government. But there is little enough immediate prospect of its being pressed by either.

That part, then, of the new trans-continental railroad scheme which might touch us nearly, is at this moment remote from practical politics, and will so remain unless we take active steps on our own account. We may safely disregard croakings concerning strategic danger offered to India by a railroad which will set troops down at a point over 500 miles up a river navigated with difficulty by small stern-wheelers and unfortified. Nor even in peace time will our Eastern possessions feel the Bagdad line to any appreciable extent. As a commercial route, involving, as it will, a double transfer of freight—at Bagdad and at Basra—it can hardly hope to compete with the Suez Canal. As a passenger route, to supersede the Red Sea, its prospects have been as unduly magnified in German publications as those of the Euphrates Valley route were magnified in English prospectuses.

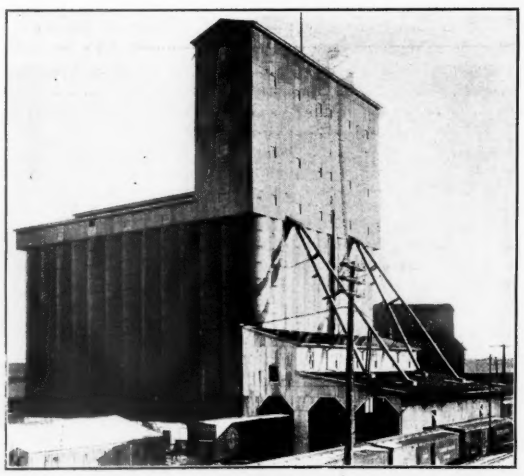


Sketch Map of the Bagdad Railroad and Related Lines.

A New Concrete and Steel Elevator.

A large grain elevator has recently been put into service by the Iron Elevator & Transfer Co., of Buffalo, N. Y. This structure, which is shown in the accompanying illustration, is made entirely of concrete and steel. It is situated on the Lake Shore & Michigan Southern, and all grain passing east over this road is weighed and transferred from western into eastern cars at this elevator, which has an actual working capacity of 60 carloads of grain in and out in a 10-hour day.

In addition to the regular work of transferring grain in transit, the elevator is equipped for cleaning and separating the mixed grains, and, for this purpose, has a storage capacity of 650,000 bushels. The storage space is divided into 90 separate steel bins with a capacity of from 1,000 to 12,000 bushels each. The bins are of rolled steel plates, cylindrical in shape; they are 65 ft. deep and the largest are 15 ft. in diameter. The foundation is of concrete and extends above the ground to form a working story, or basement, 10 ft. high under the bins.



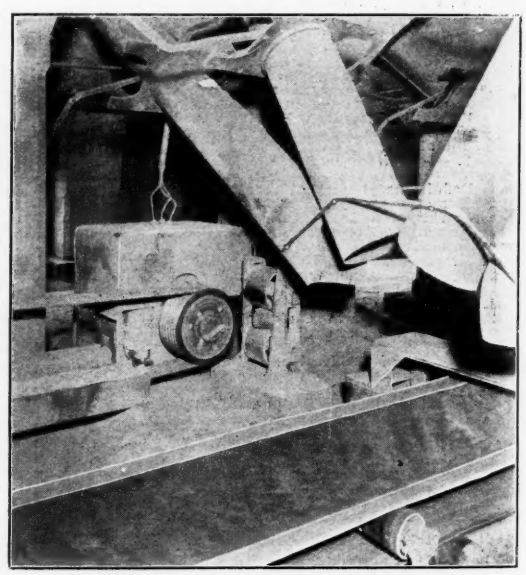
Large Concrete and Steel Elevator at Buffalo, N. Y.

The grain is handled throughout the building by means of endless rubber belt conveyors, and elevating legs which are driven entirely by induction motors. The aggregate power provided amounts to 280 h.p., which is divided among five Westinghouse, type "C," induction motors, varying in size from 30 h.p. to 75 h.p. each. The power is transmitted from the motors to the machinery by rope drives. Electric power is received from the Niagara Falls power circuits in the form of three-phase, alternating current at 2,200 volts. This voltage is transformed to 400 volts for distribution in the elevator. All motors are controlled from a fireproof electrical room in the basement of the elevator by means of a switchboard, from which the wires pass through iron conduits to the motors. In this manner all sparks attendant upon the starting and stopping of the motors are confined to this room and all possible danger of dust explosions and fires originating from the electrical apparatus is entirely avoided.

The cleaning and clipping machinery in the second story of the track shed is all driven by motors; one 50 h.p. motor is connected by a rope drive direct to a large clipper. A 30 h.p. motor is also used to drive a powerful car pulling machine in the basement.

Compressed air is distributed to all points of the elevator. This air, at a pressure of 100 lbs. per sq. in., is used for blowing dust out of the motors, for sweeping floors and beams, and for syphoning any water that may collect in the drain pits under the elevator. A blacksmith's forge is also supplied with air from this system.

In addition to the iron elevator just described, this company owns an older wooden transfer elevator and a very large feed grinding establishment, known as the Diamond Mills, situated near the wooden elevator. The former is a railroad grain elevator of the old-fashioned wooden crib type, which has been operated heretofore by steam with great economy, owing to the fact that dust and clippings from the grain were burned as fuel. The Diamond Mills, also, received power for their operation from the plant of the wooden elevator. In spite of this economy, both establishments will hereafter be operated by Westinghouse type "C" induction motors, receiving current from Niagara Falls, the change being made as a result of the marked saving in cost of operation of the new iron elevator, as compared with that of the old wooden house. The power equipment for these two plants is now being installed and will consist of three 75 k.w. oil-insulated transformers,



Belt Conveyor in Grain Elevator, Buffalo, N. Y.

provided with special tap from which a suitable starting voltage for the motors can be obtained; one 100 h.p., three 75 h.p., three 50 h.p., and one 30 h.p. type "C" induction motors operating on a three-phase circuit.

All the electrical apparatus above mentioned has been furnished by the Westinghouse Electric & Manufacturing Co. Credit for the engineering and construction work is due to the Macdonald Engineering Company, of Chicago.

Steel Castings in English Locomotive and Car Building.

Much use is made of steel castings for locomotives and cars in Great Britain, and English practice in this respect is thought by some competent observers to be better than ours. The following complete list of parts made of cast-steel has been supplied by the rolling-stock superintendent of a leading English railroad and may be taken as typical of the practice at leading locomotive and car-building shops of that country.

Spring seat clips, spiral spring sockets, horn blocks and wedges, horn stays, spring boxes and troughs, crossheads, crossheads and slide blocks combined, cross-stay and valve spindle guides, motion plates, bogie frame bottom centers, bogie frame stretchers, bogie spring cross-bar, brake-block hangers, brake-shaft brackets, foot-plate brackets, tender buffer beam brackets, valve spindle couplings, eccentric straps, reversing shafts, radial axle boxes and wheel centers.

The use of cast-steel driving-wheel centers, instead of forged centers, is becoming quite common in England, these castings being made without cutting the rim. This is accomplished by placing the wheels with continuous rims in specially devised annealing pits after

leaving the moulds. This relieves the product of internal stresses which would otherwise be set up in the process of cooling. A further precaution is to break up the moulds directly the metal solidifies, whilst the casting is still very hot.

At first British steel makers found it difficult to produce cast-steel locomotive wheel centers without blow holes, owing to the molten metal being too sluggish, i.e., not liquid enough to run freely and release the occluded gases. It is believed that to secure the desired fluidity a larger proportion of silicon was introduced, but the makers naturally prefer to keep their formulæ to themselves.

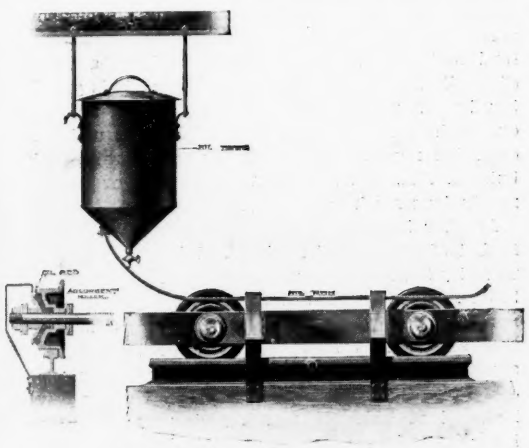
Great care is always given to the process of annealing, to which single operation about a week is commonly devoted. This often causes delay in the delivery of the castings, but it is believed to be the secret of the superiority of English practice over American. In America makers either cannot, or will not, give the time necessary for the annealing process.

Most of the difficulties which crop up in casting steel for locomotive parts may be overcome by the use of nickel steel alloy, but this material is at present too expensive to be employed. One authority informs the writer that locomotive crank axles are made of cast-steel by a North of England firm, who are prepared to give with them the highest distance guarantee known in practice. Car wheels are still made in England with wrought-iron centers, but the use of cast-steel for this purpose is becoming more common every year.

C. H. G.

An Absorbent Roller for Conveyors.

Much difficulty has been experienced by the rapid wearing of the rollers which support carriers and conveyors of power transmission machinery. The greatest trouble is due to the unsatisfactory methods of lubricating the journals of these rollers. The illustration given herewith is of a new patent roller recently put upon the market, and used by the Link-Belt Companies. The casting is cored out, as shown, and the space filled with a fibrous packing. Oil is supplied to the outer exposed



A Self Oiling Absorbent Roller.

surface of the packing, and is conveyed inward to the journal by the capillary attraction of the packing material. The oil is supplied to the packing by means of a carrier rod, along which a constant small flow of oil is maintained, the oil being wiped off by contact with the packing. The company states that the principle is not limited in its application, but has been used to advantage for many purposes. The Link-Belt Companies make a special brand of oil to be used for these rollers.

Electrical Equipment in the Albuquerque Shops.

Our issue of June 20 contained a brief description of the improvements recently completed in the Santa Fe shops at Albuquerque, N. Mex. Nothing in the way of a detailed description of the electrical equipment could be given at that time, the information not being at hand. This has now been supplied to us through the kindness of the General Electric Co., Chicago, who furnished the electrical equipment for the plant.

A new boiler plant was not put in as the battery supplying the power to the old plant was found to be adequate for the new equipment, the increased steam economy due to the installation of modern compound engines making this possible.

The engines are Ideal 15 x 22 x 16-in. tandem-compound, having extended shaft for exciter pulley and rated at 275 h.p. Alternating current generators are employed, there being two units. Both are revolving field, 60-cycle, three-phase, 150-k.w., giving 480 volts at 225 r.p.m, and are direct-connected to the engines. There are also two direct-current, four-pole, 12½-k.w., moderate speed generators used for exciters, both belt driven, one from a small pulley on the engine shaft extension, the other from a 6 x 6-in. Ideal engine.

A three-panel blue Vermont marble switchboard controls the machines and the distributing circuits. There are two sets of bus-bars, the upper of which has a capacity of 150 k.w. and is used for the lighting circuits only. The lower set has a capacity of 350 k.w., and is designed to carry the combined light and power load, and is so arranged that either one or both generators may supply the lights or motors or both, or the generators may be operated in parallel. The switchboard equipment includes voltmeters, ammeters, wattmeters, synchronizers and ground detectors in addition to the usual complement of switches, and also the exciter connections.

The transformers are all of the oil type, including three 15 k.w. for supplying the 230-volt, three-wire lighting for the shops; three 20-k.w. step-up 440 to 2,200 volts for transmission of current to the Alvarado Hotel and the station, about 2,000 ft. from the plant; three 20-k.w. step-down at the hotel and station; and one 15-k.w. 440-volt primary, 115-volt secondary.

The lighting circuits supply 27 enclosed-type alternating-current, 110-volt, weather-proof arc lamps having opal inner and plain outer globes; and 1,168 113-volt, 16-candle-power incandescent lamps. The motors are all of the 440-volt, 60-cycle, three-phase type, of which five, of 20 h.p., supply power to the machine shop, and one of 20 h.p. is used on the engine-hoist described in the previous article. In the boiler shop the tools are driven by a 20 h.p. motor, and the riveter crane and the punch and shears are independently driven, the former by a 7½-h.p. and the latter by a 5-h.p. The blacksmith shop has two 20-h.p. motors, and the flue shop one; the turntable and the transfer table are each driven by one of 10 h.p. capacity. The speeds for the different types run from 600 to 1,200 r.p.m., and all motors in the shops are placed on the floor.

In the power station the connections between the generators and the switchboard are made with cables drawn through tile pipe laid in concrete. The outside circuits are carried on poles.

New Plant of the Lima Locomotive and Machine Works.

The accompanying plan shows the new plant of the Lima Locomotive & Machine Works now under construction at Lima, Ohio. It is situated on a 15 acre tract lying between the Cincinnati, Hamilton & Dayton, the Lake Erie & Western and the Erie Railroads. The buildings are all connected by a system of railroad tracks and materials will be delivered from one department to another by means of a Shay geared locomotive. The entire plant has complete sewerage, fuel gas and water systems. The buildings and yards will be lighted by electricity furnished by their own dynamos.

The machine shop and erecting room is 120 x 220 ft. and contains four tracks which run the entire length of the building and afford sufficient capacity for 20 locomotives.

The casting storage building is 93 x 100 ft. and is of wooden construction. Herein will be stored and classified a large stock of iron and steel castings.

The blacksmith shop is 74 x 165 ft.

The frame and truck room is 74 x 125 ft., and is connected with the blacksmith shop.

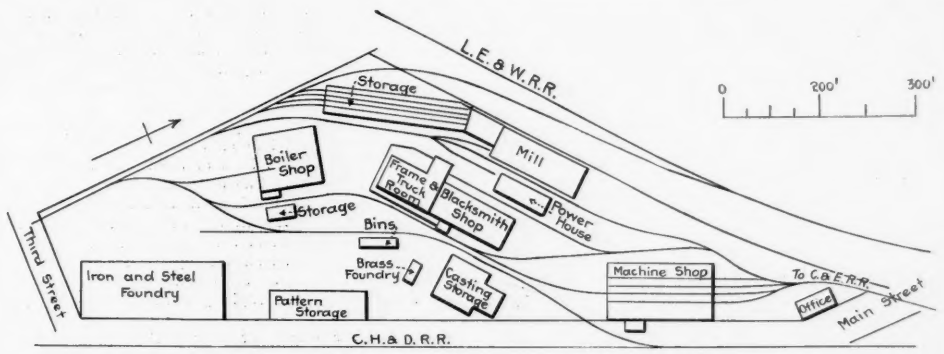
The power house is a fire-proof structure 40 x 117 ft. The boiler capacity is 500 h.p. Morison corrugated furnaces are used. This building also contains the air compressor, blowing engine for the steel foundry, and the hydraulic plant for operating the flanging presses, riveting machine, etc., in the boiler shop.

The mill building is 70 x 200 ft. and has a shaving exhaust system for keeping it free from dust and shavings.

The boiler shop is 120 x 140 ft. and is of steel frame construction. A 15-ton electric crane travels the entire distance of the center bays and several smaller ones operate in the side bays. All the large tools such as bending rolls, punches, etc., are driven by direct-connected motors. The smaller ones are connected by belts to a line shaft driven by a motor.

The brass foundry is 43 x 22 ft. The gray iron foundry is 300 x 120 ft., and will be of steel frame construction.

The plant is to be finished early this fall. Its capacity will be one locomotive a day. The buildings have been designed and are being erected by the Osborne Engineering Company, Cleveland, Ohio.



New Plant of Lima Locomotive and Machine Co., Lima, Ohio.

An Old Time-Table.

A good many of our readers have been greatly interested in the remarkably thorough piece of railroad history by Mr. Herbert T. Walker, the publication of which we have just completed. Everybody who knows much about such matters knows that nothing but love for the subject could have held Mr. Walker up to the labor of producing that history, which labor has extended over years.

The first of those articles appeared in our issue of May 30, giving a brief history of the Ithaca & Owego Railroad. The fact was mentioned there that Mr. W. R. Humphrey was a Director of the road and became its Secretary in 1846, and later he became Superintendent of the road. Mr. Humphrey's son, Mr. George S. Humphrey, sent to us two months ago a fac simile of a time-table of the Ithaca & Owego Railroad, which was printed in 1838, and it appears herewith, slightly reduced from the original. This copy of the time-table was in the desk of Mr. W. R. Humphrey at Ithaca, until his retirement from active business a few years ago.

ITHACA AND OWEGO

RAIL ROAD.

NEW ARRANGEMENT WHILE FINISHING THE ROAD.

TRANSPORTATION TRAIN.

The train of Transportation Cars will leave Ithaca every afternoon (Sundays excepted) at 4, and arrive at Gridley's at 8 o'clock. P. M., will leave Gridley's at 4, and arrive at Ithaca at 8 o'clock, A. M., stopping, both in going and returning, at Howe's Turnout, Whitcomb's and Wilsey's Mills, to take in and discharge loading, and receive Cars that may be in readiness to join the train.

The train of Transportation Cars on the Owego end of the Road, will leave Owego every afternoon (Sundays excepted) at 5, and arrive at Gridley's at 8 o'clock, P. M., will leave Gridley's at 4 and arrive in Owego at 7 o'clock, A. M., stopping both going and returning at ones' Cross Roads, Sacket's and Chidsey's Mills, at Candor Corners, and at Booth's Cross Roads to take in and discharge loading, and to receive such cars as may be in readiness to join the train.

No burden Cars are permitted to run upon the Road except such as are registered in the Secretary's Office in Ithaca, and have a Certificate of Fitness from the Engineer, and a way-bill of loading must accompany each car not belonging to the Company's Train, and toll paid at the Gates, at the rate of 3 cents per ton per mile.

DANIEL L. BISHOP, *Secretary.*

ITHACA, July 20, 1838.

Mack, Andrus & Woodruff, Printers.

The "burden cars" referred to in this time-table were owned by individuals who, under the provisions of the charter of the road, could have them added to the company's trains at certain points along the route. It will be observed that these cars are not permitted to run unless they are registered in the Secretary's office, and have a certificate of fitness from the Engineer. This indicates that even so early as this the railroad officers began to encounter the difficulties which they have met ever since with private cars. It will be observed, also, that these cars paid at the rate of three cents a ton-mile.

Early History Delaware, Lackawanna & Western.—In spite of the care exercised in the preparation of the article under the above title, some errors have crept in, which are to be corrected as follows:

Page 506, 1st column, 17th line from the bottom, for "D. M. Dotterer" read "D. H. Dotterer."

Page 530, 2nd column, 3rd line from the top, for "north bank" read "west bank."

On page 531, 3rd column, 7th line from the bottom, the drawbar of engine "Anthracite" is incorrectly described as being coupled to the bottom of the ash pan, etc. This arrangement was on the engine "Investigator" (page 586) and should have been described in connection with that engine. The drawbar of the "Anthracite" was coupled to a cross brace that went from one side of the frame to the other, and passed through the ash pan just beneath the grate bars, as shown in the drawing (Fig. 15).

On page 548, 2nd column, 15th line from the bottom, the cylinder diameter of engine "Carbon" is given as 19 in. The cylinders were originally 22 in. diameter, but were afterwards bushed down to 19 in.

Page 586, 1st column, 22nd line from the top, for "17 in." read "18 in."

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The New York Terminus of the New York Central.

We may say with authority that the New York Central & Hudson River has adopted the plan for a suburban distributing station somewhere in the region of Mott Haven, at any rate north of the Harlem. At this station trains will arrive from the Hudson Division, the Putnam Division, the Harlem and the New York, New Haven & Hartford, and here they will turn around a loop and go out again. Their passengers will ascend or descend stairs to get to the level of the trains of the Manhattan elevated (east side and west side), and also, ultimately, to the trains of the Rapid Transit Subway. Mr. Brown, the Third Vice-President in charge of operation, is reported to have said that "fully 80 per cent. of the trains that now go through the Park avenue tunnel will discharge their passengers in this Bronx station." We can well believe that 80 per cent. is not too large an estimate.

Obviously, the New York Central will not only retain the Grand Central Station and the Park avenue tunnel, and all that they now have, but will even add to the facilities south of the Harlem. Indeed, the officers of the company, in recent publications more or less official, have expressed the intention of soon working the Park avenue tunnel by electricity. Anybody who thinks about the matter will understand that the Grand Central Station must always remain a very valuable terminus. A large number of suburban passengers can be accommodated there better than in any other way. Obviously, it is a most valuable terminus for through business, and is one of the important elements in building up the passenger business of the New York Central. But the mere removal from the Grand Central depot, and from the tunnel, of 80 per cent. of the suburban business will naturally change the conditions there so much that the present disagreeable facts will no longer exist.

We should suppose that anybody who has studied the matter has appreciated that sooner or later the necessity will arise of distributing the suburban traffic while yet north of the Harlem, and the sooner such distribution is provided for the better, for land is cheaper now than it will be in the future. With the inevitable growth of traffic, no improvements to the present tunnel and no practicable additions, however great, could yield permanent relief.

We may lay it down as a principle that in dealing with suburban traffic entering great cities the aim should be to begin to distribute the traffic as early as possible, and not to concentrate it into regions already congested. We are aware that this is flying in the face of a favorite Union depot notion, but union depots are for long distance travel and not for suburban travel. The trolley is revolutionizing ideas in this matter more rapidly, perhaps, than any other one influence.

Even with the elevated railroads as they are now, an important percentage of the suburban business of the New York Central could be delivered on the Island anywhere below Forty-second street, as expeditiously as it is now delivered. This would doubtless involve running more express trains than are now run, and would necessitate some of the passengers standing longer than they now stand, and, of course, we must look forward to the completion of the improvements of the Manhattan that are now under way, and to a still further important improvement that must be made before very long. This latter is the connecting up and extending of the present middle sidings, so as to give continuous third tracks from end to end of the four lines.

It must not be supposed that the plan which is now adopted is new or has been hastily prepared. It was drawn up long ago, before the accident in the tunnel in fact, and has been before the Directors for months. We are ignorant, however, of the precise form that it has now taken, and, of course, are ignorant of the precise location of the new station, or stations. As bearing upon this subject, and as indicating some of the reasons which lead to a change so radical and so costly, we reprint from our issue of April 18 last the following words from an address delivered about that time. They state some of the facts and arguments quite as well as we could now state them, and it would be a waste of time to paraphrase them.

Some conception of the future and of the future demand for transportation may be drawn from an examination of the figures of the past. In Manhattan alone, in 30 years, the population has doubled; the passenger trips have increased seven times. In 10 years the population has increased 30 per cent.; the passenger trips increased 75 per cent. Or, to put it another way, the rides per head of population in Manhattan, on the surface cars, were 151 in 1890 and 288 in 1900. The figures show the law of increase of travel in much greater ratio than increase of population.

The north and south lines must always be overtaxed. The great movement must be to the north. In all that beautiful country north of the Harlem, from the shores of Long Island Sound around to the Hudson River, the routes of travel lie, like the sticks of a fan, converging to the north end of the island. In that region the population must increase fast until it becomes the densest suburban region in the United States, not only because of the attractiveness of the country, but from mere contiguity. It is the city marching northward. While the population of Manhattan was doubled in thirty years, the population of the Borough of the Bronx was multiplied by seven; and in the last ten years the population of that Borough has increased 148 per cent. Going further north we discover that the population of seven suburban towns on the Harlem Division gained 80 per cent. in 10 years; eight towns on the Hudson Division gained 41 per cent., and seven towns on the New Haven road gained also 41 per cent. This is a sample of what we must expect to the north, as the local means of transportation grow. In the Bronx, while its population was growing 148 per cent., the local movement on surface cars increased seven times.

But all the traffic converging from the north must now be wire-drawn through the gateways of the island. This thought gives us the clue to a broad scheme of treatment. The northern gateways will have to be multiplied, the traffic will have to be divided north of the Harlem and scattered, not concentrated. This principle of distributing traffic and destroying the terminal idea is what some of us tried to apply last year to the Manhattan terminal of the Brooklyn Bridge, and it is the only philosophical principle for dealing with the traffic of great cities. We must cease to think of great terminals, and must divide the traffic *while it is still in transit.* Obviously this can be done on the North River by ferries and tunnels and on the East River by bridges and tunnels and ferries. But it can also be done at the north end of the island, even if the traffic cannot be distributed over a wide front.

I venture the opinion that the plan recently made public for improving the entrance to the Grand Central Station by an electrified suburban loop is only a temporary relief; it is founded on the principle of concentrating traffic into one terminal. The physical limit of the tunnel and of its tracks will soon be reached. The congestion in the station and in the streets about the station will be relieved for a time, but before many years it will appear again. In the last ten years traffic in and out of the Grand Central Station has increased 33 per cent.; I should suppose that the natural rate of increase for the next 10 years would be considerably faster, because of the rapid growth of the country to the north.

I do not for a moment suggest the abandonment of the Grand Central Station, nor should I suggest any relaxation of attempts to improve the entrance to that station; this must always remain a valuable and useful station. But I venture to suggest that the suburban question of the New York Central and of the New York, New Haven & Hartford, and of other routes that may yet be developed in the north, must be met by quite other means; by the application of the principle of dividing and scattering the traffic, while that traffic is still in transit. To that end the easiest way to improve the situation is to transfer the passengers while still north of the Harlem and preferably at two or three points, to the existing lines of the Manhattan Elevated, and to the lines of the underground Rapid Transit road when that shall be completed and in operation. It must be kept in mind, however, that this implies more third track on the Manhattan and that the provision for express trains on the upper end of the new Rapid Transit is not sufficient to properly develop this plan.

The Transportation Lines of New York City.

Last week the Mayor of New York gave what he calls a "talk" on the matter of the transit and the transportation facilities of New York City. This talk was in admirable form and was judicious in matter.

Taking up first the important question of bridges between Manhattan Island and Brooklyn, it must be agreeable to the gentlemen who reported last year to the then Bridge Commissioner to find that the Mayor's theory of the treatment of the bridges is based on the principles which underlie their propositions for bridge improvement. He lays it down as certain that it is the destiny of the old Brooklyn bridge to become "wholly a thoroughfare," and as a thoroughfare it must not only arrive somewhere, but lead somewhere. It should lead south to the financial district, across the city to the Hudson river ferries and north, by the way of Centre street, to the Williamsburg bridge. Two of these purposes, namely, to cross the city, and to go north by way of Centre street to the Williamsburg bridge, were recommended by the Board to which we have referred. And their connection across the city was designed, not merely to serve the ferries, nor, indeed, principally to serve those ferries, but to intercept the enormous passenger traffic originating on the south end of the Island, to load it at a great station at Vesey street, and then to carry it across the bridge without appearing at all at the bridge station.

The Mayor applies the same thoroughfare principle to the Williamsburg bridge, thus enabling it to serve the region south of the City Hall. And again, he would connect the Blackwell's Island bridge with the City Hall region.

His notion is that the Williamsburg bridge and the present Brooklyn Bridge can be best worked by the Brooklyn Rapid Transit Company, while the Blackwell's Island bridge can be worked best by the Manhattan Railway Company with the Second avenue line. All of which is most reasonable.

The Mayor further proposes that the bridge known as the Manhattan Bridge, or Bridge No. 3, which is to be built between the Brooklyn Bridge and the Williamsburg Bridge, should have a cross-town connection, by which it may intersect the existing north and south lines on Manhattan Island. How much of these connections on Manhattan Island shall be above ground and how much below ground he does not pretend to indicate, treating this properly as a matter of detail to be settled by further study. It is gratifying, however, to find that the Mayor does not start out with the fundamental principle that under no condition must another yard of elevated railroad be built in New York City. This notion has unfortunately done much to retard progress.

Another interesting suggestion made in this talk is that of an elevated road up and down West street. The city is now constructing an exterior street there, 250 ft. wide, which will soon be completed as far north as Thirty-eighth street. The Mayor suggests that an elevated railroad should be built on this street, going far enough north to reach the right-of-way of the New York Central & Hudson River Railroad at Thirtieth street, giving an opportunity for spurs to be run to every pier, if that should be desired. This is not a new proposition; our readers have seen it brought up many times in one form or another, but it is an attractive idea.

On the whole, the Mayor's comprehensive and excellent notions so plainly set forth are sure to have great effect in the rational development of the transportation lines in New York City.

Rock Island's New Capital Plan.

The plan for recapitalizing the property of the Chicago, Rock Island & Pacific Railway referred to in these columns last week, was made public by the directors on July 31st. The plan closely approximates the outline given by us, the only essential difference in the volume of new securities being that the present holders of Chicago, Rock Island & Pacific Railway stock are to receive 70 per cent. in the preferred shares of the new company instead of 75 per cent., as there said. The plan in brief proposes the issue of securities amounting at par to a total of $202,500,000 to take up and retire the present outstanding $75,000,000 capital stock of the Chicago, Rock Island & Pacific Railway, and this great volume of bonds and shares is issued upon the property controlled by the present outstanding stock, without the addition of any new property in any form.

In detail, the new securities are to consist of $75,000,000 collateral trust bonds, which will be specifically secured by the deposit of the entire present capital stock of the Chicago, Rock Island & Pacific Railway, provided all the holders of the present stock assent to the exchange. It is announced that holders of a majority of the stock, including the directors, have agreed to the plan. Besides these collateral trust bonds, the plan provides for the issue to the public of $52,500,000 preferred shares of a new Rock Island Company which was organized in New Jersey last week; being at the rate of 70 per cent. of the present outstanding stock of the Chicago, Rock Island & Pacific Railway, which is an Illinois corporation. In addition, the new Rock Island Company of New Jersey is to issue $75,000,000 common stock. Stated in a different way, the holder of one share, or $100 par

value of C., R. I. & P. Ry. shares will receive $100 in new collateral trust bonds; $70 in new preferred shares, and $100 in new common stock. The early quotations for these new securities, established before their issue and delivery, as is the customary practice in the Wall Street markets, give an approximate selling value of from $190 to $193.50 for the securities receivable by the holder of 100 shares of Rock Island Railway stock which, under the stimulus of this new capital plan, advanced in recent weeks to above $190 per share. The quoted values of the new securities thus approximate the quotation for the existing stock.

In carrying out this recapitalization plan, two new companies have been organized. The Chicago, Rock Island & Pacific Rail*road* Company has been incorporated in Iowa with a capital stock of $125,000,000 and authorized issue of $75,000,000 bonds. This company is to purchase the stock of the present C., R. I. & P. Rail*way* Company of Illinois, issuing its bonds in payment therefor. The holders of these bonds will have a lien on all the property of the present Illinois company, including the Burlington, Cedar Rapids & Northern and the Rock Island & Peoria, the merger of these lines having been arranged for recently, and also on the Choctaw, Oklahoma & Gulf Railway, subject to the existing bonds on all this property. Title to any future extensions or acquisitions of the Rock Island system is to be taken by the new Rock Island Company of New Jersey. The new Chicago, Rock Island & Pacific Rail*road* Co. of Iowa is referred to as an operating company, but its only purpose is to hold the stock of the Rail*way* Company of Illinois and to issue bonds in payment therefor, its organization being apparently to meet legal requirements and also perhaps to limit the lien of the new bonds. Its entire $125,000,000 stock is issued to the Rock Island Company organized in New Jersey as a security holding company. This company will be virtually the controlling power in Rock Island affairs. It has at present authorized capital stock of $54,000,000 non-cumulative preferred shares and $96,000,000 common stock.

The aggregate of the new capital issues of these two new companies is therefore $350,000,000, but $125,000,000 stock of the Iowa Company is issued to the Rock Island Company of New Jersey, and will not pass into the hands of the public. Of the stock issued by the latter company, the terms of exchange for present Rock Island Railway shares call for only $52,500,000 of the preferred stock and $75,000,000 of the common stock, leaving unissued $1,500,000 of the former and $21,000,000 of the latter. Summed up, therefore, the shareholders of the present Chicago, Rock Island & Pacific Railway (of Illinois) on surrender of their securities, receive for the outstanding $75,000,000 stock, $75,000,000 in 4 per cent. bonds of the Chicago, Rock Island & Pacific Railroad (of Iowa), $52,500,000 in preferred shares, and $75,000,000 in common shares of the new Rock Island Company (of New Jersey), making a total of $202,500,000 issuable under the security conversion plan.

Payment of the 4 per cent. interest on the new bonds, and 4 per cent, dividends on the new preferred stock immediately issuable, in exchange of the outstanding $75,000,000 stock, will call for disbursement of $5,100,000 annually, of which $3,000,000 will be a fixed charge. This is against a dividend payment of $3,750,000 accruing at the 5 per cent. rate paid on the existing Rock Island Railway stock—assuming the $75,000,000 authorized to have been issued.

Interest in the issue of this great volume of new securities, to be put out without turning over any additional property to the new company, beyond that represented by the present $75,000,000 capital stock, has been intensified by very unusual provisions in the charter of the Rock Island Company of New Jersey. In recent readjustments of railroad capital, it has been customary, in the issue of preferred shares, to limit this class of stock to a relatively low maximum rate of dividend, after which all additional profits as distributed were to go to the common stockholders. In the Rock Island plan, however, provision is made for a rising scale of dividends on the preferred stock. Four per cent. may be paid for seven years; 5 per cent. for the next seven years, and thereafter the preferred stock is entitled to 6 per cent. dividends a year. Moreover, the holders of the preferred stock absolutely control the policy of the Rock Island Company, electing a majority of the Board of Directors. The number of directors first fixed is nine, and five of these are to constitute the first class, holding office for five years and to be elected by the holders of the preferred shares. The terms of the remaining directors will be arranged to have an election each year, and at each election successors to the retiring class will be elected for five years. This classification of directors cannot be said to follow any precedent among the railroads of this country. The terms of the Chicago & North Western Railway directors have long been classified, so that approximately a third of the board goes out each year, and the same practice has been adopted recently by the Pennsylvania Railroad and a number of other important corporations. None of them attempts a classification of the directors in the form adopted by the Rock Island, so that the holders of one class of stock, where there is more than one, absolutely control the board and the executive committee, and, therefore, the policy of the railroad.

Other unusual provisions in the charter of this new Rock Island Company give the directors the right to refuse to the stockholders access to the company's books and accounts; they have the right to sell and buy the shares of the company itself, and to designate and set apart working capital, to use it in buying shares if they so direct, provided no reservation for working capital shall be made in any year out of the surplus until after the payment of preferred stock dividends under certain conditions.

Altogether, the plan for the "reorganization," as it is officially termed, of the Rock Island Railway's capital, seems bound to cause renewed discussion as to what is legitimate in the capitalization of railroads. The plan has been unfavorably received in financial circles, it has aroused suspicion in the West, and the politicians, quick to perceive the trend of popular feeling, talk in Iowa of calling a special session of the Iowa Legislature to harass the new company, and perhaps to look out for their personal interests. The new scheme of recapitalizing the Rock Island is avowedly made as a means of enabling the interests, which now hold a majority of the capital stock, to reduce the heavy investment of their capital now tied up in holding the absolute majority of the shares, which the success of their plans requires, while still holding their present managing control. Their capital will be released, in very large part by sale of the new collateral bonds, their voting control will be held through holding the new preferred shares, while any sum realized by the sale of the common shares will be virtually profit on their operations, while still leaving them in control of one of the great railroads of the country. How this plan will succeed depends on whether the public will invest in the new securities.

June Accidents.

Our record of train accidents in June was published last week, page 605. It contains accounts of 30 collisions, 36 derailments, and 3 other accidents. Those which were most serious, or are of special interest by reason of their causes or attending circumstances, occurred as follows:

†8th. Black River, Mich.
12th. Hooker, Tenn.
15th. Middlesex, Vt.
18th. Mexico, Mo.
19th. Shelby, N. C.
20th. Aldrich, Minn.
22d Norwich, N. D.
†29th. Cascade, Colo.

The Black River, Mexico and Shelby accidents should be subjects for investigation by the State Railroad Commissions. No passengers were killed in the last two and only one was killed outright in the other; but the causes of the derailments appear to be so obscure or so doubtful that no clear and satisfactory explanation is given. The collisions at Hooker and at Aldrich were due to causes quite different, one from the other, yet equally discreditable.

The rear collision at Norwich, N. Dak., was not a very violent one, as the speed of the second train had been slackened, but its cause is noteworthy. The engineman at fault—who had run on the road 15 years—appears to have been very frank in his explanation; he is reported as saying:

"I was awake a mile before we ran into the train and talked with the fireman. I saw the train plainly and shut off steam, bringing the speed down to 10 miles an hour. I don't know how it ever happened. I guess it was just a piece of bad luck. I was coming down from Souris and had been working for 23 hours. That is not a very long time; why, I have gone much longer than that. I can't tell just why I went to sleep, but it was only for 40 or 50 seconds. When I awoke I was right up to the caboose and I could not do a thing. We drove clear through the caboose into a box car beyond, completely smashing it."

The engineman's remark that 23 hours is not a very long time to be on duty throws an interesting side light on the question of what hours a railroad should require an engineman to work continuously. In England the Board of Trade inspectors censure the company if a man is found to have been on duty over 12 hours. In this country the Interstate Commerce Commission, in its inquiries concerning accidents, asks if the man at fault has been on duty more than 15 hours without two hours' intermission, and if he had had seven hours' rest before going to work. Even more than 15 hours' continuous work, and without any intermission, is by no means a dangerous length of time *under favorable circumstances*. On the other hand, if the engineman's work is annoying, or if his health is not in good condition, or if his mind is preoccupied by grief, or unusual excitement, eight hours or less might be an excessive term. Again, there are many freight runs where, with a competent fireman, an engineman may without seriously neglecting his work take occasional naps of a few minutes, while on duty. This, no doubt, is done in hundreds of cases everywhere, when business is heavy and the whole force of the men on a division is required to work all the time that it can. Indeed, if the conductors and brakemen could not secure relief in this way there would be immediate need of shorter hours on many roads. But when it comes to prescribing a limit by law, where can one draw the line? Or how can the various exceptions to the rule, exceptions which everyone will admit are reasonable, be formulated? It is obvious that no hard and fast rule can be adopted without making the hours far too short for economical operation.

The problem is hard enough for the conscientious superintendent without any government interference at all; for even though he comes in direct contact with the men, and after he has adopted a rule for his own guidance in settling doubtful cases, he still finds himself unable to form satisfactory judgments in all cases. No supervising officer can tell how far it is safe to take risk in sending out a man who has been deprived of sleep; nor can he deal intelligently with men who will neglect sleep for their own selfish purposes and deceive him about it. And yet there is a definite need of men or machinery in superintendents' and trainmasters' offices everywhere to put a check on men who, like this one in North Dakota, think that 23 hours is not much of a strain on them. Possibly some modification of the pay, so that the desire to increase earnings would not so powerfully influence the men's views as to their strength of mind and body, would be a promoter of safety. What superintendent will devise a practicable scheme in this line?

The number of electric-car accidents reported in the newspapers in June was 20, in which five persons were killed and 148 injured. Two of these accidents were runaways, resulting in collisions, and another was a runaway resulting in a derailment. There were several cases of street cars running into freight trains or locomotives; one of these, killing two persons and injuring 33, is said to have been due to a defective brake.

The John Fritz Medal.

Some months ago a group of gentlemen got together for the purpose of organizing a celebration of the eightieth birthday of Mr. John Fritz. Under discussion the plan grew until it was decided to establish a John Fritz Medal, to be awarded every year "to the originators of the most useful scientific or industrial achievements, in perpetual honor of John Fritz and to the glory of engineering."

In order that many might subscribe to the fund it was decided to permit each one to contribute 10 dollars, no more and no less. Enough has now been paid in to insure the success of the project, but a little more money would be desirable. It is not proposed to ask any individual for a large subscription, therefore there is still an opportunity for those who wish to be enrolled on the honorable list of subscribers.

The purpose is, that this medal shall be awarded by a perpetual committee of 16, to be appointed or chosen in equal numbers from the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining Engineers, and the American Institute of Electrical Engineers. Rules for the award of this medal have been prepared. The field is the world. The committee may select any person, of any nationality. No award shall be made until after at least one year of consideration, and it must have the affirmative vote of at least three-fourths of the Board. The hope and belief is that this medal will be a distinction not second to the Bessemer Gold Medal, awarded by the British Iron and Steel Institute.

The public celebration of Mr. Fritz's eightieth birthday, and of the foundation of this memorial, will be held in New York City, October 31. This celebration will take the form of a dinner, in which the subscribers to the fund will have the first opportunity to participate; but it is believed that there will be room for a few guests. A circular giving particulars of the dinner will be issued in a few weeks. Meanwhile, we would suggest that any of our readers who are interested in this matter, and who may wish to be enrolled among the subscribers to the medal fund, write for particulars to Mr. John Thomson, Treasurer, 253 Broadway, New York City.

NEW PUBLICATIONS.

American Railway Engineering and Maintenance of Way Association.—The proceedings of the third annual convention of this Association, held in Chicago in March, have just been issued. The volume contains over 500 pages. Besides the committee reports and discussions, which have appeared more or less fully in the *Railroad Gazette*, there is an appendix giving all of the officers of the organization to date, a list of the members, the mileage of roads represented and members from each, index, etc. Copies may be had from the Secretary, L. C. Fritch, Monadnock block, Chicago.

"The Superintendent, the Conductor and the Engineman."—The article, with the above title, discussing the causes of butting collisions, which appeared in the *Railroad Gazette* of July 18, has been reprinted, the demand for that issue of the paper having been too great to be supplied from the regular edition. A number of officers have asked for copies to distribute among superintendents, trainmasters and others. The article has been put in a convenient pamphlet and copies may be had at 10 cents each; or 25 copies for $2.

*Prussian Railroads.**—A recent report by the Hon. Robert Collier, of the British Embassy at Berlin, on the Prussian Railroads and issued by the British Foreign Office contains much information. The report is long and comprehensive and is a real contribution to railroad literature. The writer evidently understands his subject and has some knowledge of engineering.

As Prussia is the leading country in which the railroads are state-owned the chapters on rates, both passenger and freight, are of especial interest, and these are entered into very fully. The preferential rates given to the traders for export trade are shown as well as the system under which the rates are calculated. There are

*Prussian Railways. By the Hon. Robert Collier Foreign Office Report, Miscellaneous Series No. 574. Eyre & Spottiswoode, 32 Abingdon street, London, S. W. Price, 3d. 57 pp.

three pages given over to a list of the articles granted preferential rates since 1897.

Train classification and the hours worked by the staff are also dealt with, while considerable space is filled with particulars of track signals and rolling stock.

Train speeds are mentioned and the types of engine. This remarkable statement is made: "If a train is late the driver is free to make up as much time as he can so long (theoretically) as he does not exceed the regulation speed," and later, "55.9 m.p.h. has always been the maximum speed . . . although really high speeds are never attempted the old limit is in practice not observed, and indeed if time is to be kept cannot be in many cases." This is remarkable since one had the idea that Germany was above all the home of red tape and strict adherence to rules and regulations. This is unlike France, where the limit is rigidly kept.

The pamphlet closes with the account of some runs the author made on the footplate, and after French work one can only say that the work, while meritorious, is not up to that pitch of excellence. The chief value of the document lies in the mass of facts on organization, rates, track, etc., collected.

Report of the Board of Rapid Transit Railroad Commissioners of the State of New York. 1901.—The first formal report of the Commission was issued a few days ago, and those who wish for it can probably get it from the Secretary, Mr. Bion L. Burrows, 320 Broadway, New York City. It is a volume of 300 pages, including reports of the Chief Engineer and of the Auditor, and a number of sheets of drawings, showing plans, profiles, cross sections, etc. There are also numerous illustrations from photographs, showing interesting examples of the work in progress.

Considerable space is given to the preliminary history of the Commission, but the work of construction was formally begun March 24, 1900, and the report is especially designed to cover the period from that date to 1901. The report itself is much condensed, but it records the most important points in the progress of this great enterprise.

It contains an account of the proceedings on the presentation of a gold medal to the Honorable Abram S. Hewitt, with Mr. Hewitt's admirable address. It contains also opinions of the courts on the constitutionality of the Rapid Transit act, and on various other matters. The report of the Chief Engineer, which fills 86 pages, is in considerable detail, and the volume is provided with a very good index.

TRADE CATALOGUES.

Richlé Bros. Testing Machine Co. have issued catalogue A containing descriptions and illustrations of their U. S. standard vertical screw paver testing machines, abrasion and torsion testing machines and dynamometers. A variety of special appliances and accessories are listed which facilitate the work of testing and render the results more reliable and easier of interpretation. Much information is given of value to the engineer in the manipulation of the machines and in the preparation of specimens. The company has in preparation eight other catalogues containing descriptions of machines for a variety of purposes.

New York Rapid Transit Tunnel.—The Rand Drill Company, 128 Broadway, New York, has issued a pamphlet with the above title. It is designed to describe the uses and application of Rand drills and compresses in centralized air power plants. The pamphlet is a quarto of 54 pages, and contains a short account of the rapid transit subway, with drawings, diagrams and numerous photographs. It is a convenient way of getting some accurate information about this important work.

The Boston Belting Co., Boston, Mass., has just issued a little four-page folder devoted to fire hose for factory and mill protection.

Motor Driven Tools.—Applications of the electric motor in the distribution of power.—The Crocker-Wheeler Co., Ampere, N. J., has just issued a pamphlet showing a considerable range of tools and machines driven by electric motors. There are practically no descriptions but the engravings are good and are interesting.

The Union Switch & Signal Company, Swissvale, Pa., has begun the preparation of an entire new series of catalogues, to take the place of its large catalogue issued in 1894, and the first "Section" of the new work has just been issued. It is 6 in. x 9 in., and is a stiff pamphlet of 75 pages. The paper is heavy and the binding unusually strong, making a durable as well as a handsome book.

This section is devoted entirely to mechanical interlocking machines and ground lever stands. Subsequent sections will deal with lead out connections, foundations, etc.; switch and lock movements, facing point locks, detector bars, etc.; signals, signal posts, dwarf signals, lamps, etc.; train order signals and telegraph block signals; frogs and switches. These six comprise what the company has to offer in mechanical appliances. After this there will be four sections devoted to electro-pneumatic appliances and 10 to electric appliances. The different sections will not be issued strictly in their numerical order, however, the purpose being apparently to issue first those which are most needed, or in which the 1894 catalogue has become most inadequate.

The new catalogues will not have the discussions of principles which appeared in the old one, the matter being confined strictly to illustrations and elaborate tables of references for the convenience of buyers in ordering. These tables show the prices of the articles.

Copies of the 1894 catalogues will still be furnished where desired, as long as the supply lasts. This catalogue continues valuable because many of the things illustrated in it will not appear in the new work, being superseded by later designs.

Alcohol Motors in Germany.

The German Government has offered a first, second and third prize of $2,380, $1,190, and $476, respectively, for the best "Vorspannmaschine," or draft wagon, with alcohol motor. These prizes are offered jointly by the Ministries of War and Agriculture, Domains and Forestry, and are designed to hasten and bring out in completed form the several types of spirit-motor vehicles for military and general purposes, which were more or less imperfectly represented at the exposition of the alcohol industry which took place at Berlin from the 8th to the 16th of February. The specifications provide for a machine which shall weigh, when equipped, supplied and manned in working order, not to exceed 15,750 lbs., and the heaviest laden axle shall not carry, when in service, more than 11,023 lbs. The machines shall be able to run on good roads, having nowhere a worse grade than 1 in 10, at an average speed of five kilometers (3.1 miles) an hour, or 70 kilometers (43.5 miles) a day, and to haul under the same conditions another vehicle or vehicles weighing up to 31,500 lbs. The machine shall carry a supply of spirits, oil, and all other materials sufficient for a run of two days without replenishing. When running alone without trailing vehicle, the machine must be able to ascend a grade of 1 in 5. It must be able to travel over all roads that are practicable for loaded wagons drawn by horses or oxen, and to traverse fields, meadows, and ordinary farm lanes, or to ford streams or ponds in which the water does not exceed 16 in. in depth. It must run backward as well as forward, be able to make about five miles per hour when running forward or 1.8 miles per hour backward.

The motor must be able to use crude alcohol without admixture of any other material, or, on the other hand, to use alcohol mixed with benzine or other product of petroleum without injury to the working parts of the machine, and must be provided with igniting apparatus of the best modern type. All tanks which carry inflammable material must be equipped with safety cocks.

The points which will be especially considered in the coming competition will be the following:

(1) Relation of initial weight to motive power and the susceptibility of the machine to use ballast for climbing steep grades or hauling excessive loads.

(2) Relation of cost of machine to effective power.

(3) Consumption of spirits per ton kilometer or mile.

(4) The time consumed in making the prescribed 70 kilometers per day.

(5) Durability.

(6) Ease and facility of control by the engine-driver.

(7) Interchangeability of parts.

(8) Freedom from noise, smell, and visible smoke or steam.

The trials will continue three weeks. All machines designed for the competition must be entered before February 1, 1903. The application must be accompanied by drawings to scale of all parts and details, originals or certified copies of all patents involved in the construction of the motor wagon, and the price at which it can be built and furnished to the Government.

Notes from England.

BY R. HOPE.

The recent accelerated London to Manchester trains by the London & North Western which have been mentioned before, gave me one of the finest runs that is possible. The train was the 5:30 p.m. out of Manchester from Crewe to London on the London & North Western Line.

The weight of the train empty was about 715,000 lbs. behind the tender and the engines were respectively 40 and 30 years old; the time was 2 hrs. 55 min. for the 158 miles, or 54 m.p.h. The pilot engine was of the well-known class of "singles" with the following leading dimensions: Drivers, 90 in. in diameter; cylinders, 16 in. x 24 in.; steam pressure, 150 lbs., and total heating surface, 1,074.6 sq. ft. The total weight of the engine is 63,000 lbs., with 28,400 on the drivers. The train engine was a coupled engine of the "President" class; built in 1872 and rebuilt in 1888. The coupled wheels are 78 in. in diameter, cylinders 17 x 24 in., total heating surface 1,083.7 sq. ft., and the steam pressure 150. The weight is 65,768 lbs., with 45,550 on the drivers. The cream of the run was from Bletchly to Tring, 15 miles on a continuous rise of one in 330, which was run in 16 min. 15 sec., the final speed being just over 50 m.p.h. These are well called wonderful little engines. The speed was made on the level and up hill, not by bursts down.

I have recently obtained some further fine runs on the North Eastern and other lines, and this year notice a great increase of smartness on all lines so far.

In spite of the many difficulties attendant on the introduction and use of steel bogie cars in England they are being used in increased numbers. The Midland are reported to have just contracted for some big 67,000 lb. cars on bogies for their locomotive coal. No doubt should this prove satisfactory their enterprising General Manager will purchase some more.

The average capacity of the mineral wagon continues to increase; on the North Eastern their average car now being of 32,000 lbs. capacity, while the newest ones hold 44,800 on four wheels only.

It is reported unofficially that the Great Northern are beginning to adopt the American system of accounting as introduced by the North Eastern last fall. This may be correct, and if not, is almost sure to prove so at no very distant date. The North Eastern do not intend to publish any figures under the new system till enough time has elapsed to enable them to have figures of real worth and value.

The North Eastern have just opened their first box fitted with the electro-pneumatic switches in a large cabin at one of the docks where the movement of trains and trucks is very heavy. There is still much prejudice and fear of accident in some quarters that will have to be overcome before it becomes general in Great Britain.

The Midland Great Western Ry. of Ireland has just built some express engines for the Dublin to Galway service. The leading dimensions are: Cylinders, 18 x 26 in.; driving wheels, 75 in.; total heating surface, 1,363 sq. ft.; grate area, 20 sq. ft.; steam pressure, 180 lbs. per sq. in. The engine is fitted with steam sanding, and water strainers for the injectors. The haulage capacity of the engine is said to be on the level 308 tons behind the tender at a speed of 60 m.p.h., and at 30 m.p.h. on 1 per cent. grade 281 tons.

The Great Northern is reported to be building an engine of the Atlantic type with four high pressure cylinders. The cylinders are to be 15 in. diameter, and the heating surface about 1,500 sq. ft.

The Locomotive Superintendent gives the official information that the new Marshall valve gear is at present in an experimental form only.

The main line of the South Eastern is closed near London owing to the condition of a tunnel. Sir Benjamin Baker made an inspection of the tunnels and has reported that in the case of the old tunnel for a comparatively short length there is some flaking off of the brickwork at the sides of the wall nearest the new tunnel and at the crown of the arch. The new tunnel at the same spot also showed some signs of abnormal pressure, as there were a few vertical cracks in the side wall nearest the old tunnel and the drainage culvert was somewhat distorted. The cause of the damage in both cases is the compressible nature of the soil between the two tunnels at this particular spot. The old tunnel had stood nearly 40 years without sign of failure. The remedy in both cases is the same, namely, to invert certain lengths of both tunnels.

Locomotive Performance—German Experiments.

The following table gives the results of some experiments made by Herr von Borries for the purpose of comparing the performances of three classes of engines: (A) a four-coupled, eight-wheeled, four-cylinder compound; (B) an engine of similar build to that of (A), but having two cylinders and using steam superheated to about 300 deg. C.; (C) an older type of four-wheeled, eight-coupled, two-cylinder compound.

The run in each case was for a distance of 77½ miles and back at an average speed of 55 miles per hour. The load ranged from seven to nine coaches, according to the rated capacity of the engines.

	Engine. A.	B.	C.
Weight of locomotive, tons	53.0	52.3	47.0
Grate area, sq. ft.	24.7	24.7	24.7
Heating surface, sq. ft.	1,270	1,140	1,345
Superheating surface, sq. ft.	....	301	....
Boiler pressure, lbs. per sq. in.	200	170	170
Horse-power developed	879	809	755
Coal per horse-power per hour	2.31	2.53	2.55

The four-cylinder compound (A) proved the most powerful as well as the most economical engine. The two-cylinder engines of both types were practically equal in efficiency. It is stated that the four-cylinder engine ran remarkably smooth.

TECHNICAL

Manufacturing and Business.

A. M. Crane & Co., Inc., Chicago, handling second-hand locomotives, rails, etc., have recently opened an office in New York.

The Allis-Chalmers Company, Chicago, U. S. A., has declared fifth consecutive quarterly dividends of 1¾ per cent, payable August 1st, out of net earnings.

The National Rolled Steel Car Co. has secured a site near Mercer, Pa., and proposes to build car works there. C. M. Carnahan, of Pittsburgh, is at the head of the company.

The West End iron furnace and rolling mill were sold July 31 at Roanoke, Va., under decree of bankruptcy, to Donald MacLeod, of Philadelphia, for $170,000. It is said that the furnace will resume operation.

The Colorado-Utah Construction Co., with a capital of $2,000,000, was incorporated July 22, in Colorado and Utah. The company is empowered by its charter to build railroads in these two States, and it is stated that

it will build for the Denver & Northwestern & Pacific Co., recently organized by D. H. Moffatt.

The Consolidated Car Heating Co., through its western agent, C. W. Martin, has secured the contract for heating the entire equipment of the Wisconsin Central system. This will include 111 cars now in service, and 16 building at the Pullman works; 60 passenger engines in service, and six building at the Brooks works.

The Otis Elevator Company have received an order from the General Electric Company for seven complete electric elevators with Otis motors and controllers for installation in the shops at Schenectady. The company report orders received for 51 electric elevators and 15 hydraulic elevator equipments during the past week.

Pawling & Harnischfeger, Milwaukee, Wis., makers of electric cranes and hoists, have just acquired the Gardiner Campbell Co. property adjoining their works. This property is 200 by 150 ft. in size, and the three-story building is being remodeled to supply additional machine shop facilities and extra pattern storage. The foundry is being changed, and an addition made thereto, and in the entire building will be placed a modern foundry equipment.

Because of an increasing demand for its various lines of direct-current machinery, the Crocker-Wheeler Co., of Ampere, N. J., is putting up a new building and increasing its present floor space by doing away with a number of small machines. The new building, now about half finished, will furnish facilities for nearly double the present capacity of the works; it will be three stories high and will be used for the winding departments and light machine tools. Part of the basement will be given up to experimental laboratories.

It is said that preliminaries have been arranged for a new corporation to be formed under the name of the Delaware River Ship & Engine Building Co., which will have a capital of $5,000,000 common stock, with $2,500,000 5 per cent. bonds, and will purchase the John B. Roach Ship Building plant of Chester, Pa., and the plant of Neafie & Levy. John B. Roach will be President, and Osborn Congleton, Vice-President; E. L. Levy, Secretary, and D. E. Ford, Treasurer and General Manager. None of the stock will be offered to the public.

The transfer of the International Pneumatic Tool Company of London, England, to the Chicago Pneumatic Tool Company, is practically completed. Mr. O'Donnell is now in this country making the final arrangements with Mr. Duntley. The factory of the International Company will be consolidated with the plant of the Chicago Company, already started in London, and men are now going from America to take charge of the office and factories in London. The Chicago Pneumatic Tool Co. has now a number of experts at Glasgow, giving exhibitions of riveting, etc., with pneumatic tools, for the Glasgow Federation of Ship Builders, It is expected that practically all of the yards on the Clyde will soon be equipped with pneumatic tools.

Iron and Steel.

Contract is reported let by the Norfolk & Western for 24,000 tons of rails for delivery next year. Of this amount, 14,000 tons will be made by the Pennsylvania Steel Co., and 10,000 tons by the United States Steel Corporation.

The New England Steel & Casting Co., of Philadelphia, have, it is said, located a plant along the Pennsylvania R. R., near Conover's Crossing, N. J., and will start work in September. Three furnaces capable of holding eight tons apiece are now ready, and it is proposed to build more.

Report of the Mississippi River Commission.

The Mississippi River Commission has submitted its annual report to the Chief of Engineers, U. S. A. On the first of the present fiscal year $2,539,264 was available for the improvement of the river, but owing to the failure of any appropriation since 1900 the work has been restricted to such repairs of existing work as were possible with the balances on hand. Improvements heretofore made are generally in good condition, but in some places damage has resulted from lack of funds. The cubic yardage of the levees lost by caving during the year has been ¾ of 1 per cent. of the amount already in place, and the average amount annually lost for six years is not over ⅔ of 1 per cent. During the past year the United States has built 331,679 cu. yds. of levees, and the States by which the river flows, have built 1,473,882 cu. yds. An increase in the number and capacity of the dredging fleet is recommended by which the present standard depth of 9 ft. and 250 ft. wide at low water can be increased to advantage. Since the organization of the Commission in 1879 until the present time, the total amount appropriated for that part of the Mississippi under its charge has been $43,572,693.

Car Lighting.

The Mexican Central Railway Company has recently built a Pintsch gas plant at the City of Mexico, and all the first, second and third-class coaches belonging to this company have been equipped for burning this gas. The plant consists of four large furnaces and eight storage holders, each having a capacity of 29,680 cu. ft. The apparatus is capable of producing 50,000 cu. ft. in 24 hours.

Station Elevators for the Manhattan Railway.

The Manhattan Railway Company (Elevated) is about to install four passenger elevafors in a new station at One Hundred and Tenth street and Eighth avenue, New York City. Each of these elevators will have a maximum lifting capacity of 3,300 lbs., and a speed of 300 ft. a minute. The travel of each car will be 60 ft. The elevators will be run by electricity, and will be equipped with magnet controlling devices. They will be supplied by the Otis Elevator Company.

A Thames Tunnel.

A new tunnel in London under the Thames has just been finished and was opened for traffic on the 4th of August. The tunnel is lower down the river than the Blackwell tunnel and is only built for foot passengers, there being a traffic of about 1,300,000 persons annually over a ferry that crosses near by. The time of construction has been three years, though the actual tunneling under the river only took eight months. It was driven by a shield and the tunnel is 1,217 ft. long, 11 ft. in diameter, and 13 ft. under the river low level.

The Nile Dam.

A despatch of Aug. 1 announces that the last coping stone was laid on the Nile dam, at Assouan, on July 30. John Aird & Co. are the contractors, and they undertook to finish the work in five years from July 1, 1898. The work will be completed in considerably less than the contract time.

Blue Prints Made by Day or Night.

All printing rooms are familiar with the difficulty of securing a blue print in dark weather. Messrs. Williams, Brown & Earle, 918 Chestnut street, Philadelphia, Pa., are now making a cylindrical electric blue print machine which does the work rapidly by either day or night. They are also making a blue print wringer, which does the work rapidly without injuring the surface.

THE SCRAP HEAP.

Army Posts in the Philippines.

Work is progressing rapidly on the new Army post on the Pasig River, near Manila, P. I., for which Congress appropriated $500,000 early last winter. The Army appropriation bill last session carried $1,500,000 for other posts in the Islands, and General Chaffee will recommend their location.

Potomac River Improvement.

Col. Charles J. Allen, Corps of Engineers, U. S. A., in his report to the Chief of Engineers on the improvement of the navigation of the Potomac River by widening and deepening its channels, says that $400,000 can be profitably spent during the fiscal year ending June 30, 1904, in carrying on work under the approved project. The total amount of material removed from the different shoals in the lower Potomac River during the past fiscal year under the two contracts was 397,880.5 cu. yds., making a total of 1,072,267.5 cu. yds. dredged since March, 1899, at a cost of $85,206.

The Yorkshire Power Scheme.

A power scheme, of unusual interest, is developing in Yorkshire, England. The area of the district is about 1,800 sq. miles and it contains about 158 local municipalities with a population of about 2,000,000. It will be the policy of the power company to confine its operations to the supply of power in bulk to local municipal authorities and other large consumers. There is now in use about 2,000,000 horse-power in this district. It is intended ultimately to have four independent power stations but, for the present, one plant of 10,000 kilowatts will be put in operation at Thornhill, about 20 miles north of Sheffield. Feed water and water for condensing purposes will be taken from the river Colder. The pressure of distribution will be 10,000 volts distributed to sub-stations interconnected on the high tension side. The service will be either continuous current at 500 volts or else three-phase alternating current with 300 to 360 volts pressure between phases. Mr. H. F. Parshall is engineer to the undertaking.

Vancouver Power Tunnel.

The Vancouver Power Company has awarded to Ironsides, Rennie & Campbell the contract for a tunnel two and one-half miles long through the mountain separating Lakes Beautiful and Coquitlam. The tunnel will cost $250,000 and the entire cost of the power scheme will be over a million dollars.

Steam and Electric Roads in England.

This latest development in the struggle of the railroad companies in England against other forms of rapid transit in and around the cities is the news that the North Eastern has decided to use electric traction on its short lines in and around New Castle. In a paper read before the Society of Electrical Engineers some time ago Mr. Langdon, the Electrical Superintendent of the Midland, advocated the entire electrification of that large line on all its four tracks out of London for the first 50 miles for express, local and freight trains.

Reduction of Rates on Packing House Products.

Rates on packing house products from Kansas City to Chicago have been materially reduced. On Aug. 1 the Chicago Great Western announced a tariff to become effective Aug. 8 reducing the rate from 23½ cents to 18½; and at the same time the rate on dressed beef was reduced to 20 cents. On Aug. 4 the other roads took action to meet the reduction of the C. G. W., but it was reported that on shipments of packing house products for Chicago proper the rate would be made 20 cents. It is expected that the rates on live stock will be reduced in the same proportion. The C. G. W. claims that in making the reduction it merely anticipated the action of one of its strongest competitors. The competing line had opened negotiations with certain packers for a guaranteed share of their business for a long period in consideration of a reduction in rates. The C. G. W. acted promptly on this information, and is now said to have made certain of a large share of the traffic from Kansas City in packing house products for at least a year.

The Pennsylvania Railroad in New York.

On Tuesday of this week a conference was held between representatives of the Pennsylvania Railroad and committees of the Rapid Transit Commission and of the Aldermen of New York City. The amendments to the franchise agreed upon at this conference were the use of the tunnel by the city for fire and police telegraph wires; work to begin within one year after acceptance of contract, and to be completed within five years, the Rapid Transit Commissioners to have power to extend the time not more than five years; the Department of Health to have sanitary control; at the end of 25 years the question of compensation to be taken up on a new basis; the franchise to be controlled by a subsidiary company, organized under the laws of the State of New York. The Pennsylvania declined to amend the franchise so as to pay the prevailing rate of wages or to make an eight-hour day. The company did not care to take a position that would control the contractors, and particularly to insert an illegal provision in the franchise. The old story of diverting freight from New York to Montauk Point came up. The President of the Borough of Manhattan made a great point of this. As we are bound to assume that he is a man of intelligence, we must conclude that he was merely "playing to the galleries" or possibly "sparring for wind." Another conference will be held September 3.

Purdue University.

The following additional appointments to the Purdue Faculty have recently been made: Mr. J. R. McColl to be Associate Professor in Thermodynamics, and Mr. Fritz B. Ernst to be Instructor in Car and Locomotive Design. Mr. McColl is a graduate of the department of Mechanical Engineering, Michigan Agricultural College, Class of '90, and has done work as a graduate student both in that institution and at Cornell University. After serving for a time as an assistant, he was in 1892 placed in charge of the department of Mechanical Engineering of the University of Tennessee at Knoxville, and for 10 years has devoted himself to its development. Mr. Ernst is a graduate of the department of Civil Engineering of Purdue University, Class of '00, and since graduating has been a member of the editorial staff of the *Railway Age*.

LOCOMOTIVE BUILDING.

Mitsui & Co., Japan, have ordered another locomotive from the H. K. Porter Co.

The Wisconsin Central is building six locomotives at the Brooks Locomotive Works.

The Choctaw, Oklahoma & Gulf is having 14 locomotives built at the Baldwin Works.

The Chicago, Rock Island & Pacific is reported to have ordered 100 locomotives from the Brooks Locomotive Works.

The Louisville & Nashville is having five locomotives built at the Manchester Works of the American Locomotive Co.

The Colorado Fuel & Iron Co. is having two locomotives built at the Baldwin Works, in addition to the order reported in our issue of March 21.

The St. Louis, Kansas City & Colorado is having six locomotives built at the Baldwin Works, in addition to the order reported in our issue of June 20.

The Missouri Pacific order for 50 locomotives placed with the Brooks Works of the American Locomotive Co., reported in our issue of July 25th, calls for 13 simple, 12-wheel engines, which will weigh 326,600 lbs., with 172,000 lbs. on drivers, and 21 x 32 in. cylinders, 55 in. drivers and Belpaire boilers, with a working steam pressure of 200 lbs., 396 tubes, 2 in. in diameter, 15 ft. 2⅜ in. long, with fire-box 9 ft. 5 in. long and 6 ft. 7¼ in. wide, tender capacity 6,000 gallons of water and 11 tons of coal. The special equipment includes: American and Westinghouse air-brakes, iron axles, 20-in. M. M. Buck headlights, Monitor and Ohio injectors, Sullivan piston and valve rod packings, 3 in. Ashton safety valves, Leach sanding devices, Nathan No. 9 sight feet lubricators, Railway Steel Spring Company's springs, and Latrobe tires and truck wheels. The other 37 locomotives will be simple, consolidation engines, and will weigh 270,700 lbs., with 142,000 lbs. on the drivers, and will have 19½ x 28 in. cylinders, 55 in. drivers, and Belpaire boilers, with a working steam pressure of 200 lbs., 308 tubes, 2 in. in diameter, 14 ft. long, with fire-box 9 ft. 5 in. long and 3 ft. 5¼ in. wide, tender capacity 5,000 gallons of water and nine tons of coal. The special equipment includes: American and Westinghouse air-brakes, iron axles, Sterlingworth brake-beams, Tower couplers, 20 in. Adams and Westlake headlights, Monitor and Oliver injectors, Sullivan piston and valve rod packings, 3 in. Ashton safety valves, Leach sanding devices, Nathan No. 9 sight feed lubricators, Railway Steel Spring Company's springs and Midvale or Latrobe driving and truck wheel tires.

The Delaware, Lackawanna & Western order for 48 locomotives placed with the American Locomotive Co. is for 25 engines for fast freight service, 17 of which will use hard coal and eight soft coal; eight passenger engines and 15 soft coal switching engines. The fast freight engines are simple moguls for March and April, 1903, delivery. Total weight of soft coal engines 157,000 lbs.; hard coal, 164,000 lbs.; weight on drivers, soft coal, 136,000 lbs.; hard coal, 142,000 lbs. They will have 20 x 26 in. cylinders, 63 in. drivers, and the boilers will have a working steam pressure of 200 lbs., 300 tubes, 13 ft. 6 in. long, 2 in. outside diameter, fire-boxes, 10 ft. 6 in. long for hard coal, 8 ft. 6 in. long for soft coal, 8 ft. 4 in. wide for hard, and 6 ft. 3 in. wide for soft coal. Tender capacity 6,000 gallons of water and 10 tons of coal. The passenger engines are to be eight-wheel simple for March, 1903, delivery; total weight, 140,000 lbs., and 93,000 lbs. on drivers. They will have 20 x 26 in. cylinders, 69 in. drivers, straight-top boilers, with 185 lbs. working steam pressure; 280 tubes, 13 ft. 4½ in. long and 2 in. outside diameter; fire-box, 10 ft. 6 in. long by 8 ft. 4 in. wide; tender capacity 5,000 gallons of water and 10 tons of coal. The switching engines are to be simple and are for May and June, 1903, delivery. They will have a total weight of 130,000 lbs., 19 x 24 in. cylinders, 51 in. drivers, boilers with 185 lbs. working steam pressure, 272 tubes 12 ft. long, 2 in. outside diameter, fire-box 7 ft. 6 in. long by 6 ft. 3 in. wide, tender capacity 3,300 gallons of water and seven tons of coal. The special equipment for all engines will include: Westinghouse air-brakes, Midvale or equivalent axles, Gollmar bell ringers, Sterlingworth brake-beams, Lappin or Corning brake-shoes, Gould couplers, Dressel headlights, Hancock composite injectors, U. S. metallic piston rod and valve rod packings, Consolidated safety valves, Leach sanders, Michigan sight feed lubricators, Railway Steel Spring Company's springs, Ashcroft steam gages, Midvale or Latrobe driving, truck and tender wheel tires. The freight engines will have steel centers for main drivers and steeled cast-iron for front and back; passenger engines will have cast-steel wheel centers and Allen-Richardson valves; switch engines will have cast-iron wheel centers.

CAR BUILDING.

The Boston & Albany is in the market for 25 coaches.

The Niles Boiler Works is having 20 freights built at the Erie Car Works.

The Wisconsin Central is building 16 chair, sleeping and combination cars.

The Warren City Boiler Works is having 30 freights built at the Erie Car Works.

The Lehigh Valley has ordered five baggage cars from the American Car & Foundry Co.

The Western Maryland has ordered 21 coaches from the American Car & Foundry Co.

The Baltimore & Ohio is having 42 coaches of different kinds built at the Pullman Works.

The Nashville, Chattanooga & St. Louis is having three coaches built at the Pullman Works.

The West Virginia Central & Pittsburgh is having three coaches built at the Pullman Works.

The Colorado Southern has ordered 500 dump cars from the Ingoldsby Automatic Car Co.

The Cordoba & Huatusco is having a few freight cars built by the American Car & Foundry Co.

The Southern Missouri & Arkansas is having 250 freights built at the Barney & Smith Works.

The St. Louis & Gulf has ordered 40 flat cars to be rebuilt by the Hicks Locomotive & Car Works.

The American Car & Foundry Co. reports orders for 39 cars of miscellaneous types for different parties.

The Wabash has ordered 500 42-ft. flat cars of 80,000 lbs. capacity from the American Car & Foundry Co.

The Lake Shore & Michigan Southern has ordered 1,000 steel coal cars from the American Car & Foundry Co.

The Seattle Electric is reported to have ordered 25 coal cars of 60,000 lbs. capacity, to be hauled by an electric locomotive.

The Intercolonial, according to press reports, has ordered 150 platform cars from the Rathbun Company, of Deseronto, Ont.

The Colorado & Southern, in addition to previous orders, has ordered from F. M. Hicks three baggage cars rebuilt at the Hicks Locomotive & Car Works.

The Thornton N. Motley Company, 12 John street, New York, have placed an order for the United Fruit Company for 60 fruit cars, to be built by the American Car & Foundry Company.

The Rodger Ballast Car Company have received an order from the Brunswick & Birmingham Construction Co. for 10 of their standard convertible cars, Class CS, center and side dump, and one standard double blow car.

The Chicago & Alton order with the Standard Steel Car Co. mentioned in our issue of July 25 calls for 300 drop bottom gondola coal cars of 100,000 lbs. capacity. Length over end sills, 42 ft. 7 in.; width, 10 ft. outside of stakes; height, 4 ft. To be built of metal with metal underframes. The special equipment includes: "Solid" brake-beams; Universal brasses; Westinghouse, Hennessey and Sessions draft rigging, 100 cars each; Harrison dust guards; McCord journal boxes and Player trucks.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered 100 refrigerator cars of 50,000 lbs. capacity from the American Car & Foundry Co. for April, 1903, delivery. The cars will weigh 33,300 lbs., and will be 36 ft. 8 in. long; 9 ft. 2 in. wide, and 11 ft. 9¾ in. high at eaves. The special equipment includes: Commonsense bolsters, Westinghouse air-brakes, Washburn couplers, Miner draft rigging, McCord journal boxes, double board roofs, metal trucks and American Car & Foundry Company's wheels.

The Seaboard Air Line order for 750 coal cars, reported in our issue of July 25, should be as follows: 400 40-ton coal hopper cars, with structural steel riveted underframes, wooden sides and floors, oak end sills and double spring draft gear, Diamond rigid arch bar trucks and Westinghouse air-brakes; also 200 40-ton drop bottom gondolas, with steel underframe and side frame, fixed ends, having double spring draft gear, oak end sills, Westinghouse air-brakes and Diamond rigid arch bar trucks; also 100 30-ton capacity wooden frame coke gondola cars, with drop bottom doors and wooden coke racks, having single spring draft gear, S. A. L. standard trucks and Westinghouse air-brakes. This makes a total of 700 cars instead of 750, as previously reported.

The Vandalia order for 170 freight cars, to be built at the Terre Haute Works of the American Car & Foundry Co., reported in our issue of July 4th, calls for 125 coal cars for the Terre Haute & Indianapolis, and 45 coal cars for the Terre Haute & Logansport, of 80,000 lbs. capacity, and all for September, 1902, delivery, and weight 30,000 to 32,000 lbs. Length, 34 ft.; width, 8 ft. 4 in., with 44 in. sides, to be built of wood with wooden underframes. The special equipment includes: Pennsylvania R. R., specification axles; cast-steel bolsters; National-Hollow brake-beams; Westinghouse air-brakes; Pennsylvania R. R. specifications solid brasses; Tower couplers; Graham draft rigging; railroad company's standard dust guards; Davis journal box lids; Protectus paint; Pennsylvania R. R. specifications (Railway Steel Spring Co.'s springs); iron trucks, and American Car & Foundry Company's 33 in. wheels.

The Southern writes in regard to the 65 cars reported ordered July 25, that only 33 have as yet been let. These were let to the American Car & Foundry Co., and consist of 12 coaches, 15 baggage and express cars and six combination passenger and baggage cars. Length, over end sills, coaches, 66 ft.; combination cars, 65 ft.; baggage and express cars, 61 ft.; width over end sills for all three classes, 9 ft. 8½ in.; the height, top of rail to top ventilator, 14 ft. 6 in., to be built of wood with wooden underframes. Special equipment includes King's automatic truck bar device, Southern standard sandwiched outside bearings, O. H. steel axles, National hollow brake-beams, Corning brake-shoes, Westinghouse air-brakes, Buhoup three-stem couplers, Forsythe curtain fixtures, Pantasote curtains, Harrison dust guards, Gold heating system, McCord malleable iron journal boxes and journal box lids, Pintsch gas, Standard steel platforms, canvas roofs, Railway Steel Spring Company's springs, Pullman wide vestibules and Latrobe steel tires.

BRIDGE BUILDING.

Dallas, Texas.—The Missouri, Kansas & Texas passenger department has issued an official circular stating that general washouts have occurred near Whitney and Dublin and the sale of tickets west of Whitney is ordered discontinued. Losses of track and bridges are reported from nearly every railroad in the State.

Dayton, Ohio.—It is said that preliminary plans will be made within a few months for a new steel bridge over Third street which will involve a heavier expenditure than the Main street bridge.

Erie, Pa.—At a meeting of the railroad committee of the City Councils July 25, it was decided to go back to the original plans for the overhead bridge from the Pennsylvania tracks in the southeastern part of the city. These provide for a bridge on the Buffalo road, if the Pennsylvania will contribute $25,000. (Construction Supplement, March 14, 1902.)

Flemington, N. J.—A large stone bridge crossing Beaver Brook between Highbridge and Lebanon was blown up with dynamite on July 31 by unknown persons. The Board of Chosen Freeholders had recently refused to replace the old structure with a new one. The bridge was built in 1868 and had been considerably damaged by recent floods.

Glencoe, Ont.—A new steel bridge will be built over the Strathburn River.

Greenfield, Ind.—Notice is given that bids will be received by the County Commissioners of Hancock County, Ind., on Aug. 9, for fills to bridges—one at the bridge across Sugar Creek in Buckcreek Township, and one at the bridge across Brandywine in Center Township. Robert G. Wilson, County Commissioner.

Hillsboro, Texas.—The Missouri, Kansas & Texas steel bridge on the Dallas branch was washed out by a severe flood July 26, and carried intact 100 yds. down the creek.

Howard County, Md.—The Commissioners on July 22 received a petition signed by a large number of taxpayers, asking for an appropriation for a bridge from Patuxent River, on the public road, from Long Corner to Damascus, the cost to be borne jointly by the two counties.

Hillsboro, Texas.—Three steel bridges were washed away by a flood on July 26. One of these was on the Brandon and Bynum highway, and the others were on Jack's Branch west of Hillsboro.

Houston, Texas.—The County Commissioners call for bids for a steel bridge over Harris Bayou, on the Main street public road, bids to be opened Aug. 14 at noon.

Indianapolis, Ind.—Press reports state that the Lake Erie & Western will build a bridge across White River in the northern part of the city.

Kingfisher County, Okla. T.—It is probable that an 80-ft. steel bridge will be built across the creek near Okarche, on the county line between Kingfisher and Canadian Counties, Okla. T.

Mayking, Ky.—It is said that work will begin soon on a bridge over the Kentucky River at the east end of Whitesburg to be built by the people of Whitesburg and Letcher Counties. This bridge will connect with the Stonega stage road, which will be ready Oct. 1.

Millerstown, Pa.—The Board of State Bridge Viewers appointed by the Dauphin County Court have viewed the site and reported in favor of building a new bridge across the Juniata River at the above place. The new bridge will be of steel, "Pratt" pattern, in three spans, 706 ft. long between abutments, with a 22-ft. roadway and an 8-ft. footway on the upper side of the bridge. The estimated cost is $92,000. If no appeal or exceptions are filed to the proceeding, contracts will be ready for letting in about 60 days.

Monte Vista, Fla.—A petition is being circulated asking for a bridge across the Palatlakaha River at its mouth.

Newark, N. J.—Bids were opened July 30 for the new steel structure to be built over Newark Bay by the Central R. R. of New Jersey. There will be seven masonry piers required: 560 ft. of pile fender, and 14 steel cribs. (May 30, p. 402.)

New Florence, Pa.—The Pennsylvania has offered to build either an overhead bridge or tunnel underneath the Ligonier street crossing at this place, at an estimated cost of $20,000. The town has not as yet given its decision in the matter.

Newport, Ind.—The Board of Commissioners of Vermillion County, Ind., will receive sealed bids at the office of the Auditor of the county at Newport, Ind., until 2 p.m., Aug. 18, for the superstructure of a bridge over Norton Creek, on the State road, about 1½ miles north of Clinton. Wm. P. Bell, Auditor.

New York, N. Y.—Borough President Swanstrom has reported to the Board of Estimate and Apportionment in favor of a new bridge over the Gowanus Canal at Hamilton avenue, Brooklyn. In his report to Mayor Low, after describing the situation and the probable increase in the value of property which a new bridge would cause, he says: "A new modern bridge is, in my opinion, absolutely necessary. The estimated cost is $160,000. This, however, includes not merely the construction of a new bridge but also the expense incident to the necessary change of grade and of repaving. I respectfully, therefore, report that the request of the South Brooklyn Board of Trade should be granted."

North Redwood, Minn.—Bids are wanted Aug. 12 for a steel bridge of 90-ft. span over Redwood River, Redwood County, Minn. The bids will include foundations. J. N. Tompkins, County Auditor, Redwood Falls, Minn.

Portland, Pa.—Press reports state that the Delaware, Lackawanna & Western will build a new bridge over the Delaware River between Portland and Delaware, Pa., further up stream than the present.

St. John, N. B.—The Government will probably build a steel structure to replace the suspension bridge.

Seguin, Texas.—The bridge across the San Marcos River, built by Guadalupe County, was washed away July 29.

Souris, Man.—Sealed tenders will be received until Aug. 9 for the substructure of a bridge across the Souris River at Souris. The work will consist of concrete abutments. Plans and specifications can be seen at the office of J. W. Breakey, Secretary of the Municipality of Glenwood, Man.

Terre Haute, Ind.—It is said that the Illinois and Vigo County Commissioners could not agree on the letting of a contract for a bridge over a creek on the Illinois and Indiana boundary line, and that bids will be readvertised for.

Washington, D. C.—On the recommendation of Gen. Gillespie, Chief of Engineers, U. S. A., the Secretary of War has approved the site selected for the highway bridge across the Potomac River, about 1,200 ft. further up the river than the new Long Bridge of the Pennsylvania R. R. The design for the bridge submitted by the Board of Army engineers has been approved and the preparation of plans and specifications for the bridge has been placed in charge of Col. Charles J. Allen, Corps of Engineers, who has been authorized to ask bids and make a contract or contracts for the work, and the preliminary work will be begun at once. The bridge will be steel trusses on stone piers on pile foundations. There will be 11 fixed spans of 216 ft. each, and the piers will correspond as nearly as possible with the piers of the Pennsylvania R. R. bridge in order to avoid obstructing the river. There will be one swing draw span of 290 ft. with openings 100 ft. wide on each side of the pivot pier, and the draw will be operated by electric motors. The total width of the roadway for cars and vehicles will be 40 ft. between wheel guards and there will be sidewalks 8 ft. wide on each side of the bridge; the total width of the bridge from railing to railing to be 62 ft. There will be a double track for electric cars with overhead trolley on the bridge and on the Virginia side, and under trolley on the Washington side. The total cost of the bridge will be $996,000, and it must be completed in four years.

Other Structures.

Argentine, Mo.—The Atchison, Topeka & Santa Fe let the contract for an artificial ice plant at this place on July 28, to the Featherstone Mfg. Co. of Chicago. Last spring a large ice house owned by the company at this place was destroyed by fire and it has not yet been rebuilt. It is said that the new plant will cost $80,000, and have a capacity of 75 tons a day.

Danbury, Conn.—The New York, New Haven & Hartford is asking bids for a new union station at Danbury, on the Berkshire Division. The new station will be built of buff or mottled brick, with a slate roof.

Ironville, Ohio.—Contract has been let to A. Bently & Sons for the 20-stall roundhouse to be built at this place for the Wheeling & Lake Erie. (Aug. 16, p. 581.)

Latrobe, Pa.—It is said that a new station will be built by the Pennsylvania at this place on the site of the old Clifford House.

Mankato, Minn.—Press reports state that the Chicago, Milwaukee & St. Paul and the Chicago Great Western will build a union station here, to be ready for use before winter, and to cost about $60,000.

Marshalltown, Iowa.—Plans have been received for the new Chicago Great Western depot and bids asked from contractors at Marshalltown, Des Moines, St. Paul and Minneapolis. The building will be 28 x 98 ft.

Shelby, Ohio.—It is stated that the tube mill of the United States Steel Corporation, now located at Toledo, Ohio, will be moved to Shelby, Ohio, in addition to the works now in operation there. The Toledo mill has been closed for some time.

Steubenville, Ohio.—Announcement has been made that the Pittsburgh, Cincinnati, Chicago & St. Louis will build a new passenger station at this place to cost $50,000.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

Master Car and Locomotive Painters' Association.

The Thirty-third Annual Convention of the Master Car and Locomotive Painters' Association will be held at Boston, Mass., Sept. 9, 10, 11 and 12, 1902, convening at 10 o'clock a.m., Tuesday, Sept. 9th. Headquarters will be at the Copley Square Hotel. The subjects to be presented are:

1. Is it good practice to use the same priming on burnt off parts as on the renewed parts of Passenger Equipment Cars?
Chas. Becker, Cleveland, Cincinnati, Chicago & St. Louis Railway, Delaware, Ohio.
H. M. Butts, New York Central & Hudson River R. R., Albany, N. Y.

2. Coal tar is the best protective paint that can be adopted for use on steel cars where the color is not an objection.
F. S. Ball, Pennsylvania R. R., Altoona, Pa.
W. O. Quest, Pittsburgh & Lake Erie R. R., McKees Rocks, Pa.

3. Suggestions on practical scaffolding in the Railroad Paint Shop, with sketches or prints.
C. A. Schroyer, Supt. Car Dept., Chicago & North Western Ry., Chicago, Ill.
J. D. Wright, Baltimore & Ohio R. R., Baltimore, Md.
W. H. Dutton, Lehigh Valley R. R., Sayre, Pa.

4. Some of the relations of Chemistry to Painting.
Dr. C. B. Dudley, Chemist, Pennsylvania R. R., Altoona, Pa.

5. What are the best methods and materials to be used in making the silvered gothic glasses of the modern Passenger Coach?
B. E. Miller, Delaware, Lackawanna & Western R. R., Scranton, Pa.
D. L. Paulus, Barney & Smith Car Co., Dayton, Ohio.
G. H. Worrall, Boston & Maine R. R., Somerville, Mass.

6. What causes putty to bulge from the nail holes of some Passenger Equipment Cars soon after they leave the shop when we should expect it to shrink? How can it be avoided?
H. W. Forbes, Erie R. R., Jersey City, N. J.
C. E. Mance, New York, Ontario & Western Ry., Middletown, N. Y.
W. C. Fitch, Southern Pacific Ry., Sacramento, Cal.
F. J. Rodabaugh, Pittsburgh, Ft. Wayne & Chicago Ry., Ft. Wayne, Ind.

7. The difficulties encountered in Locomotive Painting.
G. J. Ginther, Wabash R. R., Moberly, Mo.
J. A. Gohen, Cleveland, Cincinnati, Chicago & St. Louis Ry., Indianapolis, Ind.
A. R. Lynch, Pittsburgh, Cincinnati, Chicago & St. Louis Ry., Dennison, Ohio.

8. Why a Railway Master Car and Locomotive Painter should meet with his fellows in convention.
Charles E. Copp, Boston & Maine R. R., Lawrence, Mass.

9. Car roofs from the painters' standpoint—What is the most economical and durable roof to maintain? What is the best color to use?
B. F. Seisler, Wabash Ry., Decatur, Ill.
J. F. Lanfersiek, Pittsburgh, Cincinnati, Chicago & St. Louis Ry., Columbus, Ohio.

10. Report of Committee on Tests.
W. O. Quest, Pittsburgh & Lake Erie R. R., McKees Rocks, Pa.
T. J. Rodabaugh, Pittsburgh, Ft. Wayne & Chicago Ry., Ft. Wayne, Ind.
G. H. Worrall, Boston & Maine R. R., Somerville, Mass.
H. M. Butts, New York Central R. R., Albany, N. Y.
Frank Crocker, Kansas City, Ft Scott & Memphis R. R., Kansas City, Mo.

Queries:

1. What is the best paint material to use on the tubs at water stations?
2. Do varnish removers give good results?

3. What shop material combination makes the best joint packing for locomotive front ends, etc.?
4. The best car glass cleaning methods and materials.
5. Should compound gothic glass be bedded in putty?
6. What is the best material for stencils?

PERSONAL.

—Mr. D. I. Roberts, who was for 10 years General Passenger Agent of the Erie Railroad, has gone to the Little Kanawah Railroad as a Director and as Vice-President. He will have charge of operation under the President, Mr. J. T. Blair, and will also have other duties.

—Mr. Charles W. Culp, the Assistant General Manager of the Richmond, Fredericksburg & Potomac, was born at Mechanicsburg, Pa., in 1856. In 1867 he entered the service of the Pennsylvania Railroad as a messenger boy in the office of Mr. A. J. Cassatt, then Superintendent of Motive Power. Later he became an extra operator on the Pittsburgh Division. In 1881 he was promoted to be Train Despatcher, later becoming Chief Train Despatcher. In 1890, he was made Passenger Trainmaster, from which position he resigned to become Assistant General Manager of the Richmond, Fredericksburg & Potomac.

—Mr. J. D. Besler, the retiring General Superintendent of the Chicago, Burlington & Quincy, has held that position since 1885. He has had 46 years of continuous service with the Burlington, beginning as a trackman, and rising through the various positions of foreman, roadmaster, superintendent and general superintendent. By the recent change Mr. Besler becomes a member of the staff of the Second Vice-President in an advisory and consulting capacity, his long experience and thorough knowledge of practical details well qualifying him for such a position. He will be assigned to special duties connected with construction work and the general inspection of the company's property.

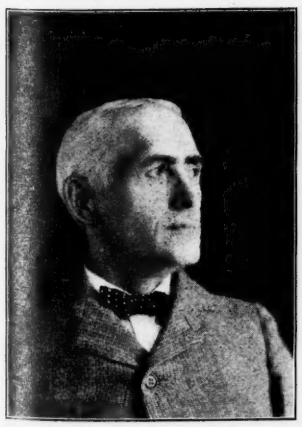
—Mr. G. W. Berry, who recently became Acting Superintendent of the Chattanooga Division of the Cincinnati, New Orleans & Texas Pacific, was born in 1871. He held the position of operator at Hornellsville, N. Y., on the Erie for three years, and was for five years despatcher at the same point. He then became Chief Despatcher on the Rome, Watertown & Ogdensburg Division of the New York Central & Hudson River, where he remained for three years. From this position he went with the Southern, later going to the Queen & Crescent as Chief Despatcher. On July 3, this year, he became Trainmaster, and a few days later assumed the Acting Superintendency of the Chattanooga Division.

—The new Master Mechanic of the Kentucky Division of the Chesapeake & Ohio, Mr. George W. Hepburn, was born in Bloomington, Md., in 1869. He entered the Baltimore & Ohio shops at Piedmont, W. Va., in 1885, where he served his apprenticeship, after which he was transferred to the shops at Glenwood, Pittsburgh, Pa. He resigned from this position to go with the Chesapeake & Ohio, and in 1890 became roundhouse foreman, then general foreman, and three years later was promoted to the position of Assistant Master Mechanic of the Huntington Division. In 1900, Mr. Hepburn took the same position on the Cincinnati Division at Covington, where he remained until his recent appointment.

—Mr. Thos. L. Longley, the new Superintendent of the Des Moines, Iowa Falls & Northern, is about 43 years old and has been in railroad service continuously for 25 years. He started as a brakeman. In 1877 he was made night operator and yardman on the Michigan Central, and later was transferred to Michigan City, Ind., as train despatcher. In 1888 he resigned from the Michigan Central to go with the Elgin, Joliet & Eastern, where he remained for five years. Mr. Longley later returned to the Michigan Central in charge of an important junction and transfer station, where he was stationed until May, this year, when he became Trainmaster, from which position he has been promoted as above.

—Major Josiah Pierce, Jr., a civil engineer and a veteran of the Spanish-American War, died in Washington last week. Major Pierce was born in Russia in 1861, his father being connected at that time with the United States Legation at St. Petersburg. He obtained his early education in Russian schools and subsequently at King's College, London, and at Cambridge University, where he received a M. A. Upon coming to this country he took a post-graduate course at the Massachusetts Institute of Technology and also at Johns Hopkins. He served as instructor and professor of engineering in the Columbian University, Washington, and in the Catholic University of America. In 1888 he was permitted to make a special study of the method of ordnance survey in Great Britain and received the Telford gold medal and premium of the Institution of Civil Engineers for a paper on "American Methods of Mapping." He served as a Major of Engineers in the Spanish war.

—Mr. Fletcher C. Rice, whose appointment as General Superintendent of the Chicago, Burlington & Quincy became effective August 1, has been in railroad service for 39 years, all of which time has been spent with the Burlington. He was born at Palmyra, N. Y., in 1844, and received his education at Beloit College (Wis.) He began with the Burlington as a clerk and telegraph operator at Monmouth, Ill., in 1863. He was promoted to charge of the telegraph office at Mendota, Ill., from which he was transferred to Galesburg in 1866, becoming train despatcher. This position he held until 1877, when he was made Chief Operator and Chief Train Despatcher of the Galesburg Division, and was advanced to be Trainmaster two years later. In 1881 he was made Superintendent of the Galesburg Division, and in 1888 received the appointment as Superintendent of the Illinois Lines, with jurisdiction over all lines of the Chicago, Galesburg and St. Louis divisions. Mr. Rice is recognized throughout the West as an expert in handling trains and in the movement of traffic, and is the pioneer in the matter of operating trains on double-track by signals without train orders. He has been the representative of the Burlington System at various times in the American Railway Association meetings, and was prominent as a member of a committee of that body on train rules, and also on a committee on block signals and interlocking.



ELECTIONS AND APPOINTMENTS.

Canadian Pacific.—J. Manson, Division Superintendent at Winnipeg, has been appointed Division Superintendent of the Ontario Division, with headquarters at Toronto, Ont., succeeding F. P. Brady, who has become Division Superintendent at Fort William. J. T. Arundel succeeds Mr. Manson at Winnipeg, Man.

Central of New Jersey.—W. M. Yount, Superintendent of Car Service, with headquarters at Jersey City, N. J., has resigned. (See Choctaw, Oklahoma & Gulf.)

Chicago & Alton.—H. V. Miller, Superintendent of Telegraph, with headquarters at Bloomington, Ill., has resigned.

Chicago, Burlington & Quincy.—F. C. Rice has been appointed General Superintendent, with headquarters at Chicago, succeeding J. D. Besler, transferred to the staff of the Second Vice-President. Mr. Besler will be assigned to special duties connected with Construction Work and the general inspection of the company's property. H. D. Judson succeeds Mr. Rice as Superintendent of the Illinois Lines, with headquarters at Galesburg, Ill. W. B. Throop becomes Superintendent of the Chicago Division, at Aurora, Ill., and R. M. Kimber, Superintendent of the Galesburg Division, at Galesburg, effective Aug. 1.

Choctaw, Oklahoma & Gulf.—W. M. Yount, heretofore Superintendent of Car Service of the Central of New Jersey, has been appointed Superintendent of Car Service of the C., O. & G., with headquarters at Little Rock, Ark., succeeding C. E. Mandeville, resigned.

Cincinnati Northern.—J. B. Flanders, General Superintendent, with headquarters at Van Wert, Ohio, has resigned. (See Detroit Southern.)

Denver & Rio Grande.—F. Mertsheimer, formerly Superintendent of Motive Power and Machinery of the Kansas City Southern, has been appointed Superintendent of Machinery of the D. & R. G., succeeding H. Schlacks, resigned.

Detroit Southern.—J. B. Flanders, heretofore General Superintendent of the Cincinnati Northern, has been appointed General Superintendent of the D. S., succeeding J. W. Sherwood, resigned.

Erie.—G. W. Dowe, heretofore Superintendent of the New York, Susquehanna & Western, has been appointed Superintendent of the Delaware Division of the Erie, succeeding W. H. Barrett, who has been transferred to the Wyoming and Jefferson Division, succeeding J. M. Davis, who in turn succeeds Mr. Goldsborough as Superintendent of the Allegheny Division. (See New York, Susquehanna & Western.)

Georgia Northern.—C. W. Pidcock has been appointed General Manager in addition to his duties as Vice-President, with headquarters at Moultrie, Ga.

Great Northern.—J. L. Forepaugh has been appointed Superintendent of the Breckenridge Division, with headquarters at Breckenridge, Minn., succeeding Mr. Egan. B. F. Egan has been appointed Superintendent of the Kalispell Division, with headquarters at Kalispell, Mont., succeeding Mr. Bowen, Acting Superintendent. L. W. Bowen succeeds Mr. Forepaugh as Assistant Superintendent of the Northern Division, at Grand Forks, N. Dak.

Illinois Central.—Owing to the illness of Superintendent C. K. Dixon, of the Omaha Division, C. B. Fletcher has been appointed Acting Superintendent of that division, effective Aug. 1.

Little Kanawah.—D. I. Roberts, formerly General Passenger Agent of Erie, has been appointed Vice-President of the L. K., in direct charge of operation. He has also been elected a Director.

Long Island.—J. E. Gillmor, heretofore Supervisor of Signals on the Pennsylvania, has been appointed Signal Engineer of the L. I., with headquarters at Long Island City.

Manistee & North Eastern.—P. R. L. Carl has been appointed Auditor, with headquarters at Manistee, Mich., succeeding Robert Porteous, resigned, effective Aug. 1.

Michigan Central.—E. H. Millington has been appointed Superintendent of Telegraph, with headquarters at Detroit, Mich., succeeding E. E. Torrey. M. B. Snow has been appointed Division Superintendent, with headquarters at Jackson, Mich., succeeding F. P. MacDonald.

Missouri Pacific.—H. D. Hunter has been appointed Division Superintendent, with headquarters at Osawatomie, Kan., succeeding E. J. Ward.

New York, Susquehanna & Western.—C. S. Goldsborough, heretofore Superintendent of the Erie, has been appointed Superintendent of the N. Y., S. & W., succeeding G. W. Dowe. (See Erie.)

Northern Pacific.—A. E. Mitchell has been appointed Superintendent of Motive Power, succeeding Alfred Lovell. Effective Sept. 1. Mr. Mitchell is now Assistant Superintendent of Motive Power of the Chicago, Milwaukee & St. Paul.

Pennsylvania.—H. M. Patrick has been appointed Supervisor of Signals, with headquarters at Jersey City, N. J., succeeding J. E. Gillmor, resigned. (See Long Island.)

St. Louis, Kansas City & Colorado.—H. R. Irvine, heretofore Superintendent, has been appointed Master of Trains and Roadway, with headquarters at Union, Mo. The position formerly held by Mr. Irvine has been abolished, effective Aug. 4.

The Rock Island Company of New Jersey.—At a meeting held July 31, W. H. Moore was elected Chairman of the Finance Committee, and George T. Boggs and H. C. Frick were elected new Directors. (See R. R. News column.)

Wabash.—We are informed that there is no truth in the reports that H. W. Ashley is to become General Manager of this company.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALASKA CENTRAL.—An officer writes that five surveying parties are now in the field completing surveys for this projected line from Resurrection Bay, Alaska, to Rampart, on the Yukon, due north. Contracts for grading, track laying, etc., for the Southern Division out of Resurrection Bay will be let some time this fall and work will begin on this portion of the projected line before winter, according to present plans. The entire length of the route surveyed is about 500 miles. The character of the work is not especially difficult. The highest elevation is 2,600 ft. G. W. Dickinson, General Manager of the Seattle Electric Co., who served on the Northern Pacific from 1889 to 1897 as General Superintendent, and then as General Manager, is President, and John E. Ballaine, Seattle, Wash., is Secretary and Auditor.

BALTIMORE & CHESTERTOWN (ELECTRIC.)—This company has been incorporated in Maryland to build an electric road from Chestertown west to Rock Hall and Tolchester Beach. The capital stock is $75,000. The total distance proposed is about 18 miles. Henry R. Fothergill, of Wilmington; Harcourt N. Trimble and others, of Philadelphia, are the incorporators.

BALTIMORE & OHIO.—An officer writes that the following work on the Pittsburgh & Western Division, between New Castle Junction and Akron, Ohio, has been authorized: 1. The building of a terminal and yard of 1,800 cars capacity at New Castle Junction. 2. Second-tracking the line between New Castle Junction and Hazleton, 14.2 miles. 3. Rebuilding and second-tracking the Trumbull & Mahoning line from Hazleton to a point on the south side of the Mahoning River at Niles, 8½ miles. 4. Rebuilding the line between Niles and Cuyahoga Falls, Ohio, 39.3 miles. This is to be built double-track, with necessary passing tracks, etc. This line shortens the present route between five and six miles and eliminates a large amount of curvature, leaving very little above 2 deg., and reduces eastbound grade from 0.6 of 1 per cent. to 0.37 of 1 per cent., and westbound grade from 1 per cent. to 0.3 of 1 per cent. Contracts are to be let for this work at once.

BEAVER VALLEY.—Grading is reported to be in progress on this steam road from Vanport to West Bridgewater, Pa., three miles. W. A. Clugston, 248 Fourth avenue, Pittsburgh, Pa., is Chief Engineer.

BELLINGHAM BAY & BRITISH COLUMBIA.—Contract was awarded July 19, to Nelson & White, of Seattle, to build 10 miles east from the present terminus at Maple Falls, Whatcom County, Wash. The cost of the work is $100,000 and work has already begun. (July 4, p. 543.)

BURNSVILLE & EASTERN (LITTLE KANAWHA).—This company on July 29 filed its charter at Parkersburg, W. Va. It is proposed to build a connection between the West Virginia Central & Pittsburgh and the Little Kanawha roads by means of a line about 40 miles long. The incorporators are officers of the Little Kanawha.

CALIFORNIA ROADS.—Press reports state that the Diamond Match Co. will build a standard gage road from the Southern Pacific at Nelson, Cal., 31 miles northwest of Marysville, to timber lands in the mountains of Butte County, and that surveys are already being made.

CANADA ATLANTIC.—Location is reported of a spur line four miles long from Caldwell Station, Ont., to the Radnor iron mines. The mines belong to the Messrs. Drummond, of Montreal.

CANADIAN PACIFIC.—Contract for a line 22 miles long between Labelle and Nominingue, has been let to D. R. McDonald, and it is said that work will be begun at once. Location and surveys were reported completed last June. (June 13, p. 453.)

CANTON & NEW PHILADELPHIA (ELECTRIC).—This company was incorporated in Ohio July 26, to build an electric road from Navarre to New Philadelphia, 18 miles. Edward C. Louis, Jeremiah E. Reeves and others, of Canton, Ohio, are the incorporators.

COLUMBUS & LAKE MICHIGAN.—This company was incorporated with headquarters at Defiance, Ohio, July 24, with a capital stock of $800,000, as successor to the property and rights of the Columbus, Lima & Milwaukee, projected by B. C. Faurot. The project failed after 40 miles of railroad between Lima and Defiance had been built and the property was recently sold at receivers' sale for $285,000. The articles of incorporation state that the new company proposes to build from Columbus to a point in Michigan, running in Ohio through the Counties of Franklin, Madison, Union, Auglaize, Putnam, Allen, Defiance and Williams. The incorporators are Wm. B. Whiting, J. A. Garrettson, Elliott C. Smith and others, of Cleveland.

COLUMBUS & SOUTHERN.—This company has been incorporated in Ohio to build from Columbus to Wellston, Ohio, passing through the Counties of Franklin, Fairfield, Hocking, Jackson and others, with several branches. The new company is the purchaser of the Lancaster & Hamden road, recently sold by order of the United States Court.

CUMBERLAND.—This company has been incorporated as an auxiliary of the Cumberland Coal Co., and will build from a point on the Louisville & Nashville near Artemus, Ky., to Lunsford, 10 miles. C. W. Stone, of Warren, Pa., is President.

DELAWARE & MAGNETIC SPRINGS.—This company was incorporated in New Jersey July 24, with the New Jersey Corporation, Guarantee & Trust Co. as agent, and the stated objects are to produce and furnish power by means of air, water, steam, electricity, etc. J. Albert Odell and others, of 419 Market street, Camden, N. J., are the incorporators.

DULUTH, MISSABE & NORTHERN.—Contract has been let to Halvorson & Richards, of Minneapolis, for a short line from Eveleth, Minn., to mines.

FLORENCE & MOBILE.—Surveys are reported from Florence to a point near Leighton, Ala., 10 miles, for this proposed road.

GALESBURG & GREAT EASTERN.—It is said that this road, which is now building between Victoria and Walnut Creek, Ill., will extend beyond Victoria to Wyoming Creek, 21 miles.

GRAND TRUNK.—Announcement is made that the management will proceed with the double-tracking of the Midland Division as soon as the work now in progress on the Montreal-Toronto Division is finished.

HALIFAX & YARMOUTH.—The Halifax County Council declined to vote Messrs. Mackenzie & Mann a grant of free right of way for their line between Halifax and Yarmouth, but instead voted them a sum not to exceed $5,000 as a bonus towards the cost of such right of way. (July 11, p. 562.)

IRON MOUNTAIN & GREENBRIER.—According to most recent advices, this company, incorporated in West Virginia last August, is in the interest of the St. Lawrence Boom & Mfg. Co., of Roncevert, W. Va., and will extend from White Sulphur to timber lands. Grading was begun last April on the first 17 miles, and it is planned eventual-

ly to build about 30 more. P. B. Houston, of White Sulphur, W. Va., is Chief Engineer.

Kansas City, Beatrice & Western.—Preliminary steps for building this projected line in Nebraska were taken July 22, when the company filed a mortgage for $500,000 to the Union Trust Co., of Philadelphia. It is said that work will be begun at once. The road is to be built from Grand Island, Neb., southeast to Lincoln and Virginia, 100 miles. O. J. Collman, of Beatrice, Neb., and others are interested. (May 23, p. 386.)

Kansas City, Outer Belt & Electric.—Certificate of incorporation has been given this company in Missouri, having a capital stock of $1,500,000, of which $500,000 is preferred. The articles specify that six miles of road will be built in Kansas, two miles in Clay County, Mo., and three-fourths of a mile in Jackson County, Mo. The incorporators are A. J. Stillwell, E. E. Holmes and others, of Kansas City, and elsewhere.

Lake Erie & Detroit River.—Henry S. Culver, Consul at London, Ont., states in his report of July 16 that the arrangement lately made between the Pere Marquette and the Lake Erie & Detroit River will doubtless prove of vast importance to western Ontario. By virtue of this agreement, the Pere Marquette secures the right to run trains over the Lake Erie & Detroit River tracks from Port Sarnia, Ont., to Rondeau and Port Stanley, Ont., where it will connect with the car ferry from Conneaut, Ohio, thus making a short cut from the upper peninsula of Michigan to the Bessemer and Lake Erie road and the eastern States. Supplying as it does nearly all the soft coal for western Ontario from the Ohio and Pennsylvania fields, the ferry is already of considerable importance, but it is expected through this new arrangement that greater facilities will be added to the ferry system across Lake Erie, making it a line of general traffic, adapted for passengers as well as freight. There is now but one ferry steamer running across Lake Erie between Conneaut and Port Stanley. It has a capacity of 26 to 28 loaded cars and makes 12 round trips per week. It is proposed to add several steamers of equal or greater capacity, sufficient to meet all the demands of the new line. The distance from Port Sarnia to Conneaut, Ohio, is about 150 miles, half by land and half by water. (July 18, p. 579.)

Mexican Central.—The accompanying map, furnished by an officer, shows the building now in progress and contemplated for the immediate future on the lines of the Mexican Central. First, a line is being built from San Pedro to Paredon, connecting the main line with the old Monterey & Mexican Gulf, recently purchased. The total length is 140 miles, with a 1 per cent. maximum grade going west, .3 of 1 per cent. maximum grade going east, and maximum curvature of 4 deg. Contract for grading is in the hands of Messrs. Hampson & Smith, of the City of Mexico. The grading work is well under way for about 19 miles from San Pedro, and 10

miles from Paredon, track laying having recently been commenced from the San Pedro end. Second, a line is building from Lecheria to Pachuca and Sandoval, connecting with the line recently purchased which runs from Sandoval to Apulco, with a branch to Santa Ana. The length of the line from Lecheria to Sandoval is 46 miles, with a branch 10 miles long to Pachuca. The maximum grade on this line is .6 of 1 per cent., with maximum curvature of 2 deg. The contractors are Bell & Semmes, of Lecheria. Grading work is well under way for about 12 miles from Lecheria, and material is now on the ground for track laying. A line is also under survey from the eastern terminus of this same road at Apulco, but no definite location has yet been made. The broken lines in the cut show the two pieces of work on which building is in progress and also the proposed location of the third line.

Montgomery Traction.—This company has been incorporated in Alabama, with $1,000,000 capital stock authorized. It is proposed to build an electric line from Montgomery to Pickett Springs, and also on various streets in Montgomery. The incorporators are B. L. Holt, W. H. Ragland and others, of Montgomery.

New Mexico Roads (Electric).—A company is said to have been formed in the East to build a system of electric lines in the northern part of New Mexico, having Las Vegas as a center.

Norfolk & Western.—Track laying is reported in progress on a branch 9½ miles from Welch, W. Va., to reach coal properties.

North Carolina Central.—Charter was granted this company at Raleigh, N. C., July 29, with $2,000,000 capital. It is proposed to build from Concord to Fayetteville, N. C., a distance of 150 miles. Edward W. Shredd, of Providence, R. I.; A. H. Slocum, of Fayetteville, N. C.; M. H. Caldwell, of Concord, N. C., and others, are the incorporators.

Northern Pacific.—It is stated that a cut-off 25 miles long will be built from the terminus of the Central Washington at Coulee City, to Adrian, on the Great Northern, which will cut off 150 miles of the haul to the coast. It is thought the new line may be completed by fall, 1903.

It is said that track laying will begin at once on the Quinault extension from Grass Creek, Wash., to Chenause Creek, two miles. When the trestle at this point is completed, it is intended to extend the line rapidly towards Humptulips City.

Okaw Valley.—This company has been incorporated in Illinois to build from Venedy in Washington County, to New Athens in St. Clair County, a distance of about 20 miles, connecting at New Athens with the Illinois Central.

Oklahoma & Texas Southern.—Contract has been let to grade this line from Nacona to Montague, Texas, 11½ miles, and it is said that the line will be continued to tidewater by way of Stephenville, 125 miles out of the 350 total projected. Charter was filed at Austin, Dec. 31, 1902. W. A. Squires, of Henrietta, Texas, is President. (April 11, p. 278.)

Oregon & Idaho Central.—This company was incorporated at Baker City, Ore., July 28, with the purpose of building from Baker City, by way of Eagle and Pine valleys to Seven Devils, Idaho. The Seven Devils country begins at the Snake River on the Idaho side, and it is about 40 miles from Baker City to the river on the Oregon side.

Oregon Short Line.—It is said that an extension of the Utah & Pacific line will be built from Lund, Utah, to Cedar City, 26 miles, opening up iron ore deposits.

Pennsylvania.—One of the tracks on the new change of line between Cove Forge and Aqueduct, Pa., four miles, was opened July 25. The change begins about half a mile west of Cove Forge Station and enabled the company to dispense with 15 grade crossings in the town of Duncannon. The work was very heavy.

Pueblo Rapid Transit.—Franchise has been granted this company to build an electric road from Pueblo, Colo., to Beulah, 30 miles. Work must begin within 60 days and be completed within two years.

Raleigh & Cape Fear.—Contract for the extension of this line in the direction of Fayetteville, N. C., has been let to Stewart & Jones, of Clifton, Va. The line has been located from its present terminus at Sinpahaw to Lillington, 10 miles, and Fayetteville is about 22 miles beyond Lillington, due south. It is understood that Stewart & Jones will do grading only. (May 30, p. 404.)

St. Louis & North Western.—An officer sends the following information about its proposed line in Missouri, which was chartered June 28: Surveys are being made. The road is to be eventually about 100 miles long, from Brookfield, Mo., to a point on the Missouri, Kansas & Texas, but the exact route has not been located. Grades and curves will be light and there will be no bridges. Contracts for grading will be let soon after the survey is completed, and it is thought likely that bids for rails and rolling stock may be asked for in five or six weeks. J. K. Pearson, of Painesville, Ohio, is Chief Engineer, and J. G. Gallemore, of Salisbury, Mo., is Secretary. Henry Vorce, of Brandenburg & Co., New York City, is a representative. (July 18, p. 580).

St. Louis & San Francisco.—Contract for the branch from Scullin to Sulphur, Ind. T., seven miles, has been let to Johnson Bros., of St. Elmo, Ill., and it is said that grading has been begun.

San Antonio & Crowther.—Preliminary surveys are now reported completed between San Antonio and Crowther, Texas, and it is stated that final location will be made at once. Charter for this company was filed last May, with headquarters at San Antonio, and it is designed to reach new oil fields. A. C. Pancoast, San Antonio, Texas, may be addressed. (June 6, p. 422.)

Shreveport & Red River Valley.—Contract has been let to Epple & Haves, of Shreveport, La., for an extension of 20 miles from Mansura to Water Valley, La. They may be addressed at Mansura, La.

Texas & Oklahoma (Missouri, Kansas & Texas).—An officer sends advices to the effect that the line is projected from Coalgate, Ind. T., to Oklahoma City, Okla. T., a distance of 110 to 115 miles. Two parties are now at work running preliminary lines. F. N. Finney is President, and F. W. Fratt is Chief Engineer, Mr. Fratt's address at present is Wainwright Bldg., St. Louis, but it is likely that he will open an office soon in Oklahoma City.

Union Pacific.—A party is in the field making surveys for a line from Walcott southerly about 50 miles to Grand Encampment. The country is heavy and 1 per cent. grades will be used. The rumor is that the line will be pushed on into Colorado towards Denver.

West Virginia Central & Pittsburgh.—Both tunnels on the Coal & Iron extension below Elkins, W. Va., have been completed. The work has required two years. (Construction Supplement, March 14, 1902.)

Youngstown & South Eastern Electric.—Further advices regarding this company, incorporated in Ohio July 3, indicate that the correct name is as above and that the motive power will be electricity. It is proposed to build from Youngstown through Coitsville to Poland and Struthers in Mahoning County, Ohio. The incorporators are H. G. Hamilton, Thomas E. Connell, Gordon Cook and others, of Youngstown. No information is obtainable as to when contracts are likely to be let or work commenced. (July 11, p. 562.)

GENERAL RAILROAD NEWS.

Baltimore & Potomac.—A meeting of stockholders has been called for Aug. 21 in Baltimore, to take action on the agreement of merger and consolidation with the Philadelphia, Wilmington & Baltimore. The new company will be known as the Philadelphia, Baltimore & Washington, and will be under the control of the Pennsylvania System, as both the component parts are at present. The Baltimore & Potomac is now operated under contract by the Philadelphia, Wilmington & Baltimore, and runs from Baltimore to Pope's Creek, Md., 73 miles, with branches which bring the total mileage up to 93.

Boston Elevated.—At a special meeting of the stockholders July 25, an increase in the capital stock from $10,000,000 to $15,000,000 par value was authorized, the proceeds to be applied to the cost of building and equipping the proposed line, and to paying indebtedness already contracted. General Bancroft is quoted as saying that he could not state accurately how much would be required for these purposes, but to complete what had been already begun would take between $3,000,000 and $4,000,000.

Brunswick & Birmingham.—Purchase of the Tifton & Northeastern was reported to have taken place July 25, the purchase price being $250,000. The Tifton & Northeastern runs from Tifton to Fitzgerald, Ga., 25 miles, through Berrien and Irwin Counties. H. H. Tift, of Tifton, was the builder and President. The sale of the Ocilla & Worth to the above was also confirmed. The Ocilla & Worth is part of the link between Brunswick and Birmingham, between Ocilla, in Irwin County, and Worth in Worth County, on the line of the Georgia Southern & Florida.

Canadian Pacific.—Tenders for a fast Atlantic mail service between England and Canada have been submitted by the Allans and the Elder-Dempster interest jointly; the Furness and several small companies, and by the Canadian Pacific. The Canadian Pacific offer involves an outlay of $25,000,000, each passenger ship to cost $4,000,000 and the freight ships to average $900,000 each. It is said that if the Government demands a higher speed than 20 knots, Halifax will be chosen as the Canadian terminal the year round and the St. Lawrence abandoned.

Chicago, Rock Island & Pacific.—A circular letter sent to stockholders of record July 31 gives details of the reorganization of this company. For an account of the financial plan, see the *Railroad Gazette* for Aug. 1, p. 611, and also editorial in current issue. The circular explains to stockholders that the main feature of the reorganization is the formation of an operating company in Iowa, and of a securities company in New Jersey. The operating company, known as the Chicago, Rock Island & Pacific *Railroad* (the previous incorporated title ending in *Railway*) offers to purchase all the outstanding stock of the Chicago, Rock Island & Pacific *Railway*, according to the plan described in our previous article. The securities holding company is known as the Rock Island Company, organized under the laws of New Jersey, with authorized capital stock of $150,000,000, $54,000,000 of which is non-cumulative preferred stock, and $96,000,000 is common stock. This company has no mortgage indebtedness. The Rock Island Co. has another agreement with the Chicago, Rock Island & Pacific *Railroad* of Iowa, under which, in consideration of deliveries of its preferred and common stock, for the purpose of the foregoing offer, the Rock Island Co. will become the owner, as issued, of the capital stock of the Iowa Company. Thus, upon the acceptance of its offer by stockholders of the present company, the Iowa Company will have acquired the entire capital stock of the present company and the Rock Island Co. (New Jersey) will, in turn, hold the entire capital stock of the Iowa Company. The capital stock of the Rock Island Company (New Jersey) not required for the purposes of this offer, is reserved for future use, for the acquisition of additional property, and for other corporate purposes.

Cincinnati, Indianapolis & Western.—At a meeting of the Cincinnati, Hamilton & Indianapolis and the Indiana, Decatur & Western Companies at Indianapolis on July 31, a consolidation of the properties was effected with the above title. The two properties are owned by the Cincinnati, Hamilton & Dayton, of which the Cincinnati, Hamilton & Indianapolis is known as the Indianapolis Division. The directors also authorized the issuance of $8,700,000 4 per cent. bonds to refund $7,000,000 7 per cent. bonds of the Cincinnati, Hamilton & Indianapolis, to take up outstanding bonds of the Indiana, Decatur & Western, and for betterment of the two roads, etc.

Indianapolis Northern Traction.—This company, which is a consolidation of a number of electric interests in different States north of Indianapolis, Ind., with lines built or projected to Muncie, Marion, Peru, Logansport, etc., has filed a mortgage for $5,000,000 to the Colonial Trust Co., of New York, to secure the payment of 5 per cent. bonds for that amount, payable in 1932. The proceeds of $3,500 will be applied to building and equipping the new line between Indianapolis and Logansport. The officers of the company are: Ellis C. Carpenter, Anderson, Ind., President; W. A. Richardson, Noblesville, Ind., Chief Engineer, and Geo. F. McCulloch, General Manager.

Pittsburgh, Shawmut & Northern.—The New York Railroad Commission has given its consent to a first mortgage for $15,000,000 to retire existing bonds and for new construction. (Feb. 14, p. 122.)

St. Louis & San Francisco.—This company has acquired a controlling interest in the stock of the Chicago & Eastern Illinois. It is said that the plan provides for the retirement of the stock, which aggregates about $14,000,000, with an issue of trust certificates which will be exchanged for the common stock of the Chicago & Eastern Illinois at the rate of about $100 par value of stock for $250 in trust certificates, which will bear interest at the rate of 4 per cent., guaranteed. It is said that a connection between the properties will be established by use of one of the existing lines between St. Louis and the Chicago & Eastern Illinois.

Southern.—This company filed a mortgage at Augusta, Ga., on July 23, for $18,000,000, to the New York Security & Trust Co. The mortgage is on the recently acquired leases and includes the old Asheville & Spartanburg, the South Carolina & Georgia, the South Carolina & Georgia Extension and the Carolina Midland Railroads. The mortgage is secured for an issue of $18,000,000 of bonds. (July 11, p. 562.)

Southern Pacific.—Further particulars regarding the change in the service of the Gulf steamers owned by this company are now at hand. The Cromwell Line, which has for some time been under the management of the Southern Pacific, will be operated directly by them under the name of the Morgan Line, and will continue to run to New Orleans and carry passengers as well as freight. A majority of the steamers of the old Morgan Line will be transferred from New Orleans to Galveston, only three remaining in the New Orleans service. Under the old arrangement the Cromwell Line ran a weekly service between New York and New Orleans, and if a shipment arrived consigned for this route too late for embarkation, it would have to lie over another week. Under the new arrangement freight on the two lines will be interchangeable. (July 25, p. 600.)

Tennessee Central.—Deeds of conveyance from the Tennessee Central Ry. Co., in Davidson County, Tenn.; the Nashville & Knoxville in Wilson, Smith, Putnam and Overton Counties, and the Tennessee Ry., in Putnam, Cumberland and Roanoke Counties, have been filed with the Tennessee Central R. R. Co., which has given a mortgage to secure 50-year coupon gold bonds, the issue to be limited to $25,000 a mile, which limits the possible issue to $15,000,000. The Mercantile Trust Co., of St. Louis, is trustee. An amendment was filed to the charter of the Nashville & Clarksville last May, changing its name to the Tennessee Central. (See also Feb. 28, p. 154.)